the OIL AND GAS JOURNAL

NOVEMBER 3, 1958

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WHAT YOU CAN LEARN FROM PILOT PLANTS

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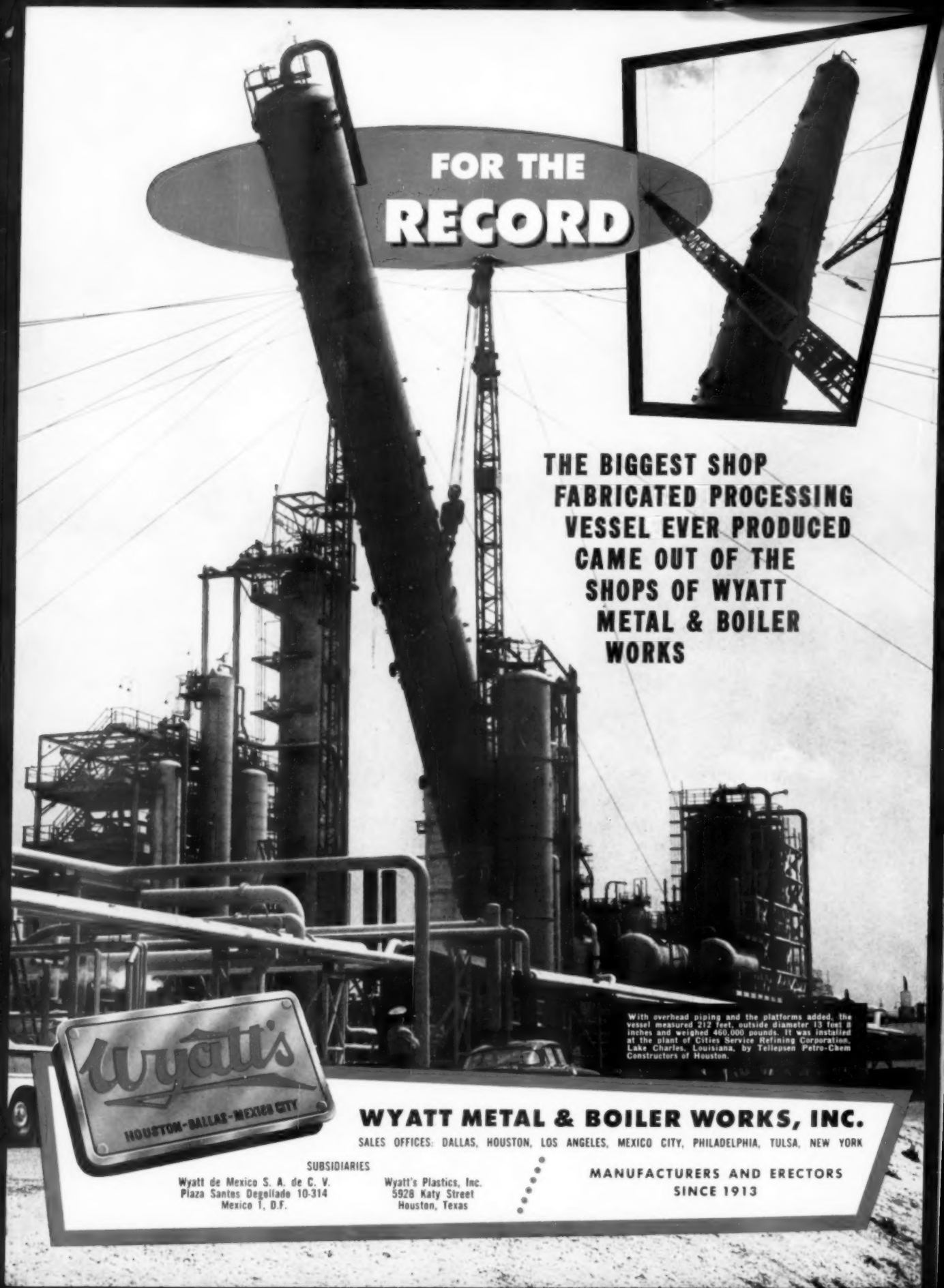
FOR THE
RECORD
THE BIGGEST SHOP FABRICATED PROCESSING VESSEL EVER PRODUCED CAME OUT OF THE SHOPS OF WYATT METAL & BOILER WORKS
With overhead piping and the platforms added, the vessel measured 212 feet, outside diameter 13 feet 8 inches and weighed 460,000 pounds. It was installed at the plant of Cities Service Refining Corporation, Lake Charles, Louisiana, by Tellepsen Petro-Chem Constructors of Houston.
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the OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
Nov. 3, 1958

Natural-gas regulation by FPC is nearing a breakdown:

Growth of this industry—already ahead of coal as an energy source in this country—will be seriously hampered unless Congress takes some action next session.

This estimate of a serious crisis doesn't come from any oil or gas-industry source. It's the opinion of an FPC member, Arthur Kline, who laid the facts before investment bankers at Denver.

Here's Kline's report:

...1,463 rate cases came before FPC from natural-gas producers between June 7, 1954, and last July 1. Of these, only 132 were resolved. And settlements resulted from a mutual agreement rather than FPC action.

...Total rate cases now are 1,600 with new filings running at rate of 50 per month.

...Regulatory body is bogged down because it has no firm criteria with which to handle cases. No cases yet have been settled by the courts to establish a precedent.

The solution:

Kline says the pending Harris-O'Hara bill would give FPC wide discretion on methods to be used in determining rates. The commission favors the bill.

Kline explains use of original-cost basis for establishing rates is almost impossible. The reason: Changeable costs. One producer may get only one well in 10 tries and must distribute his costs accordingly. Another may have better or maybe worse success.

▼ ▼ ▼

Sweeping federal control over the petroleum industry may be in prospect for Canadian oil men if recommendations of the Borden Commission are written into law.

Proposed controls cover pipeline building, prices, rates, export, import, production, and conservation of oil and gas.

Some oil officials, after studying the report, are beginning to sound a word of caution (p. 45).

Domestic demand for petroleum in 1959 looks good—a 4.5% gain, according to IPAA estimates (p. 54).

Volumes needed are put at 9,400,000 bbl. daily for domestic demand, 257,000 bbl. daily for export, and 20,000 bbl. daily for inventory buildup.

Estimates on domestic crude production and refinery runs were not made by IPAA statisticians due to uncertainty on the imports policy.

A novel approach to controlling imports was tossed out last week by Sen. Lyndon Johnson.

The Texas senator would require any foreign country seeking a share in the U. S. market to meet U. S. standards of freedom for its citizens, to split its profits with the workers, to provide equal wage standards and living standards.

Such a plan, says Johnson, would equalize production costs. It also would raise world living standards instead of "equalizing poverty."

▼ ▼ ▼

Optimism is turning to pessimism in Oklahoma Panhandle among operators who expected great production from their gas completions in the Chester and Morrow sands.

Potential tests show high initial productivity.

But some wells have not been able to buck pipeline pressure as little as 2 weeks after a connection.

The result: Operators in the area now are expected to move ahead very cautiously.

Relief for the CATC burning wells offshore is being rushed.

Mr. Gus II and Kermac Rig 46 are drilling below 3,500 ft. and the Vinegarroon is at 2,000 ft. on three relief wells aimed at killing the fires. Two big fire-fighting platforms also are in place 60 ft. off the northeast and southwest corners of the damaged platform.

Offshore wildcat in Lake Erie, earlier reported a duster, now has been completed as a good gasser.

New York State Natural Gas Co. reports that after fracturing the well came in at daily volume of 200,000 cu. ft. It is the first offshore gas well on American side of the lake.

Hot oil strikes continue in the Rockies.

First production inside Bull Mountain basin on central Montana plains is indicated at a Miles Jackson wildcat between Delphia and Wolf Springs field.

The 1 NP-McConnell in Musselshell County swabbed 22 bbl. of oil per hour with 3% acid water from Amsden at 7,079-99 ft. Previous production in this small complex basin has been restricted to the sides.

Watch the southern end of Williston basin in coming days.

South Dakota apparently will bear the brunt of new interest following apparent discovery by A. L. Schlaikjer and Herb Clarkson 1 Government.

Well found 1,890 ft. of gas-cut oil on drill-stem test of the Red River Ordovician at 8,460-8,511 ft. The possible field opener is 3½ miles southwest of Buffalo field in Harding County. It's on a trend with Cedar Creek anticline fields to the northwest.

▼ ▼ ▼

New field discoveries in Louisiana's coastal region are approaching a record (p. 141).

The score is 45 new fields so far this year with 2 more months left. This is only 21 short of the 1956 record of 66 new-field discoveries.

Achievement is remarkable because drilling in the area is off more than 250 completed wells, nearly 160 of them exploratory.

California offshore activity is picking up.

Richfield reportedly has completed its first well on its artificial island at Rincon in shallow oil pay around 2,500 ft. Production testing is waiting completion of a line to shore-based storage tanks. This will be completed early this month. Rig has been moved for next test.

The Phillips-Pauley group and Texaco both have staked locations for tests on their offshore parcels.

California Standard is drilling below 7,125 ft. on its first core test on a 3,840-acre lease it holds jointly with Humble.

▼ ▼ ▼

Watch for a switch in gas committments in Alberta.

In the mill are plans for the Dick Lake reserves to be committed to Trans Canada while Alberta Southern probably will tie into Berland River for shipment into the U. S. Northwest.

First steel pipe from a new Venezuelan mill is expected by next June.

Production timetable calls for output of 50,000 tons in 1959 stepped up to 450,000 tons by 1961. Plant could turn out 650,000 tons at full production.

Other steel products to be turned out include reinforcing rods, steel structures, rails, wire, and nails. Domestic demand is expected to consume the entire production.

New high-strength X-56 line pipe made available this year may be followed soon by X-60 pipe, having a minimum yield of 60,000 psi.

A few gas lines are using X-56 either to increase operating pressures and hence throughput or for added safety.

Look for Canada to become a major factor in international sulfur within a few years.

Gas-processing plants built or building today in Canada show total capacity of more than one-half million tons per year of sulfur recovery.

But this is only a start—potential output of more than two million tons is forecast as the vast sour-gas reserves of Western Canada come into production.

This is double the total capacity from natural gas and refinery-gas combined in the United States.

What to do with all this sulfur? It's far greater than Canada can absorb. Most likely outlet is through Vancouver to the world trade.

OCAW is renewing its drive to get oil-industry bargaining back on the track.

Union officials have ordered immediate stepped-up attempts at bargaining by all units. They indicate the union representatives have been provided with more flexibility in their plan of action.

Full plans, however, are being kept under wraps.

Optimism: Auto makers are enthusiastic over prospects for 1959 sales despite slow delivery of new models because of wildcat strikes. Nash Rambler predicts 100% increase. Big three are more conservative, but even Ford sees a 25% gain in sales this year.

▼ ▼ ▼

Company notes:

Tidewater's 1959 budget will call for capital expenditures ranging from $60 to $70 million. Outlay this year is expected to reach $60 million, according to top officials of company who held budget session in Tulsa last week.

Crude prices have been cut by Indiana Standard in parts of Arkansas, Louisiana, and Texas; and by Gulf in Mississippi. Cuts ranged from 5 to 15 cents a bbl...Union Oil warns it may be forced to cut back production of low-gravity crude in California because of oversupply and depressed prices.

Tanker market is still depressed, as witnessed by recent sales of T-2's. Seven ships changed hands recently at prices ranging from $475,000 to $650,000. During Suez crisis such ships brought prices in excess of $2 million.

Sobering thought: Engineers impressed by modern technological breakthroughs should mull over these facts turned up by Henry B. DuPont:

The Aztecs perfected a calendar based on rotation of the earth and had a margin of error totaling one day in 175,000 years.

And 2,000 years before Columbus, ancient scientists had calculated circumference of the earth within 1% of absolute correctness.

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Good Wells Make Good News

A Monthly Report of Successful Well Treatments

November 3, 1958

Fracturing with acid-base fluids and sand often gives better results and a quicker payout than either acidizing or fracturing alone. Here are some recent successful results:

- **Colorado County, Texas Gulf Coast.** (Old Gas Well) This well—completed through four sets of perforations into the Wilcox (8596 to 9127 feet)—had been dead four months. Dowell fractured with Acid Petrofrac*, using 16,000 gallons acid-oil emulsion and 16,000 pounds sand. Injection was down 2½-inch tubing at 5 bpm; pressure reached 5700 psi. 45 days after treatment, well was delivering 750 mcfd into 800 psi gathering line. Distillate recovery was 30 bpd. *Dowell treatment paid out in less than two months; total workover cost paid out in less than three months.*

- **Ector County, West Texas.** (New Oil Well) This well was completed in the sandy lime of the Tubbs formation. Solubility was about 85 per cent and salt content was about 0.35 pounds per cubic foot. Two sets of perforations (2 shots per foot) were made between 6168 and 6480 feet. No test was made before treatment because wells in this field require stimulation. Operator ordered Duofrac*. Dowell used 500 gallons Mud Acid to spearhead, followed by 25,000 gallons 7½ per cent acid with demulsifying agent and 25,000 pounds sand. 472 perforation ball sealers were injected in four stages of 118 each (after each 5000 gallons). Injection averaged 49 bpm at 2300 psi maximum. *Well is producing top allowable of 111 bopd.*

- **Cowley County, Kansas.** (New Oil Well) This well was completed in a cherty lime of 30 to 36 per cent solubility. Completion was through 10 feet of perforations and five feet of open hole. Total depth was 3031 feet. The operator ordered Acid Petrofrac. After cleaning up the well with 500 gallons of Mud Acid, Dowell fractured with 15,000 gallons acid-oil emulsion with FLA* (Fluid Loss Additive), and 15,000 pounds sand. Injection was down 4½-inch casing at 1650 psi and 27½ bpm. *Before treatment, production was ½ boph. After fracturing, the well swabbed 11 boph. State potential was 90 bopd with 5 per cent water.*

- **Burke County, North Dakota.** (New Oil Well) This well was completed in the Nesson lime through an 11-foot perforated section at about 6000 feet. Before treatment, well tested only a show of oil. After treatment with 250 gallons BDA* (Breakdown Acid), well swabbed one boph. Well was then fractured with Acid Petrofrac. Dowell injected 2000 gallons acid-oil emulsion with FLA (Fluid Loss Additive) and 1750 pounds sand. Injection rate was five bpm at a maximum pressure of 5800 psi. *30 days after treatment well was flowing 90 bopd.*

The selection of the most promising stimulation treatment is often the most important part of a successful job. Take full advantage of Dowell's experience in selecting the treatment best suited to your well. For service or more information, call any of the 165 Dowell service points and offices. In Canada, contact Dowell of Canada, Ltd.; in Venezuela, contact United Oilwell Service. Dowell, Tulsa 1, Oklahoma.

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OIL AND GAS PIPELINES • REFINING • PETROCHEMICALS
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TECHNOLOGY—OPERATION

Drilling-Production

Stearates, Foaming Agents Combat Water in Air or Gas Drilling 78

By B. V. Randall, J. L. Lummus, and R. P. Vincent

These two materials have been found effective in tests carried out by Pan American Petroleum Corp. Stearates work best when water production ranges from trace amounts to approximately 2 bbl. per hour. Foaming agents are effective when water flow is from 2 to about 60 bbl. per hour.

Filter Test Determines Quality of Flood Waters 84

By D. H. Stormont

The plugging tendency can be determined by passing a small quantity of the injection water through a membrane or molecular filter. Test also identifies solids responsible for plugging.

How to Cut Sludge-Handling Costs When Treating Oil-Well Waste Water 101

By H. B. McCord and Melvin Enquist

Formerly it cost $800 per month to dispose of sludge from Santa Fe Springs waste water. Now aeration and chlorination allow for much better dehydration and the sludge-trucking bill is only about $150 per month.

Pipelining

On The Job . . . Pipelining: Design of Valve Operators 111

By J. N. Morrell

Here is a discussion of the valve-operator requirements which should be kept in mind by the designer. These points apply only to line valves.

Transducers Protect Large Centrifugal Pipeline Pumps 71

By W. W. Holt, Jr.

New electronic protective equipment provides more accuracy and better repeatabilities. It has also increased the rates of response of the temperature, pressure, and vibration shutdown functions.

Refining-Processing

Adsorption Process Now Practical for Recovery of Natural-Gas Liquids 74

By W. M. Dow

During the past 2 years the commercial feasibility of raw-gasoline recovery by means of a dry extraction process has been well established. This meets an industry-wide need for a field-processing method to treat relatively small or lean gas streams.

Process Costimating: Heat Requirement for Distillation-Type Process Unit 88

The Role of the Pilot Plant in Processing . . 90

By D. J. Oriolo

It plays an important part in development of new process or improvement of existing one, in study of unit operations, in producing marketable lots of new products, and in acting as trouble shooter for existing plant.

Planning the Turnaround at a Small Refinery 94

By George M. Allen

At Sinclair's Sinclair, Wyo., refinery, planning is an integrated group effort without the aid of specific planning staff. Over-all planning divides into three parts: (1) pre-preplanning, (2) preplanning, and (3) shutdown.

How to Reduce Fuel-Gas-Line Corrosion . . 107

By Larry Resen

Relatively simple corrective measures can reduce fouling in fuel-gas lines. Water-injection facilities together with slight design modifications can practically eliminate troublesome problems.

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SHOT BLASTING

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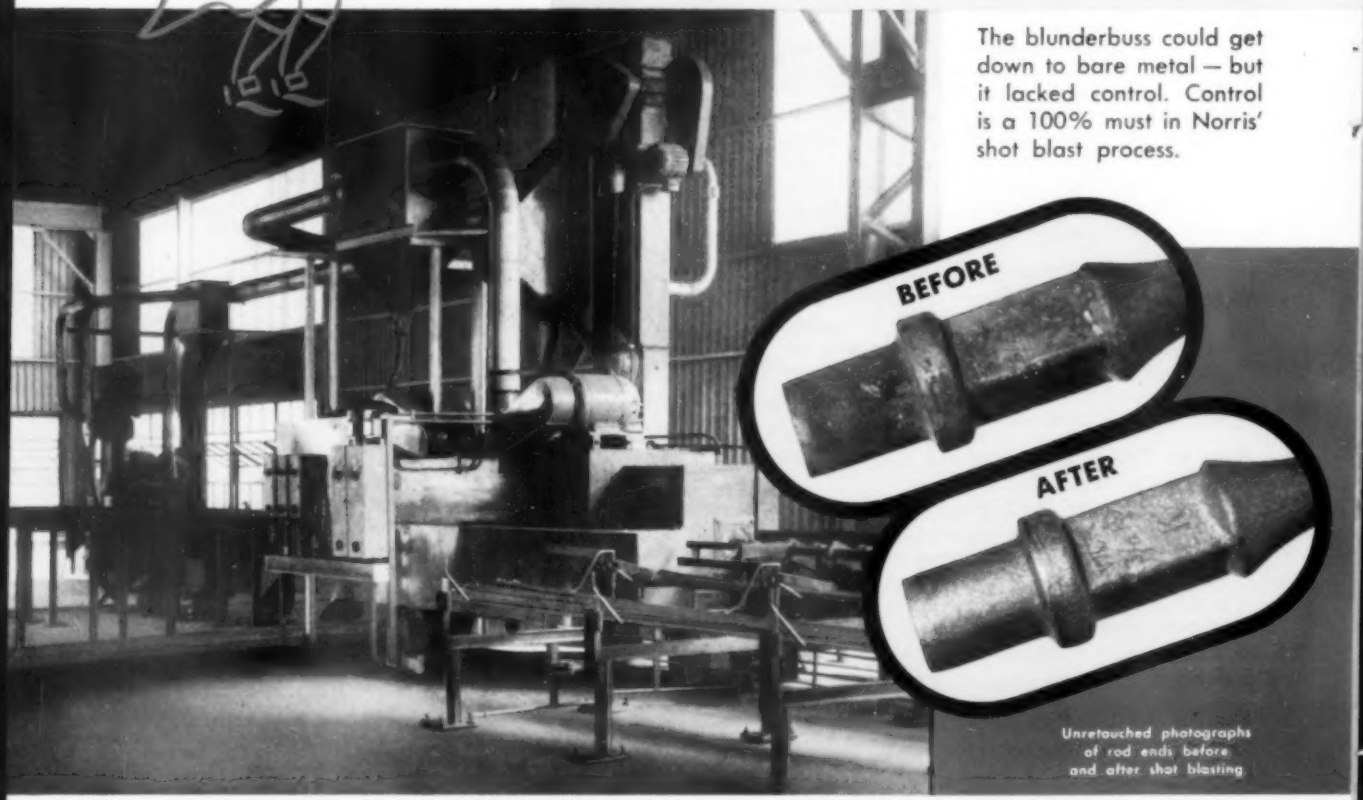
The blunderbuss could get down to bare metal — but it lacked control. Control is a 100% must in Norris' shot blast process.



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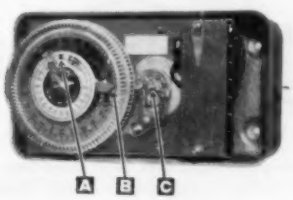

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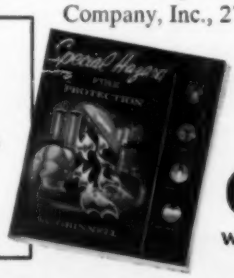

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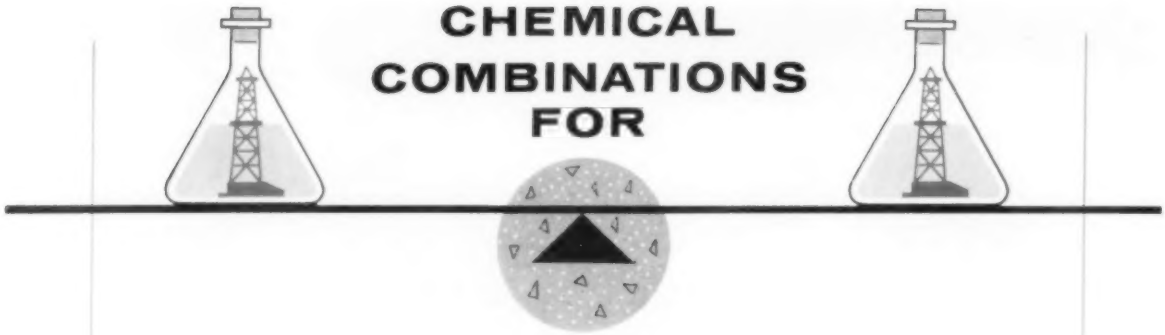

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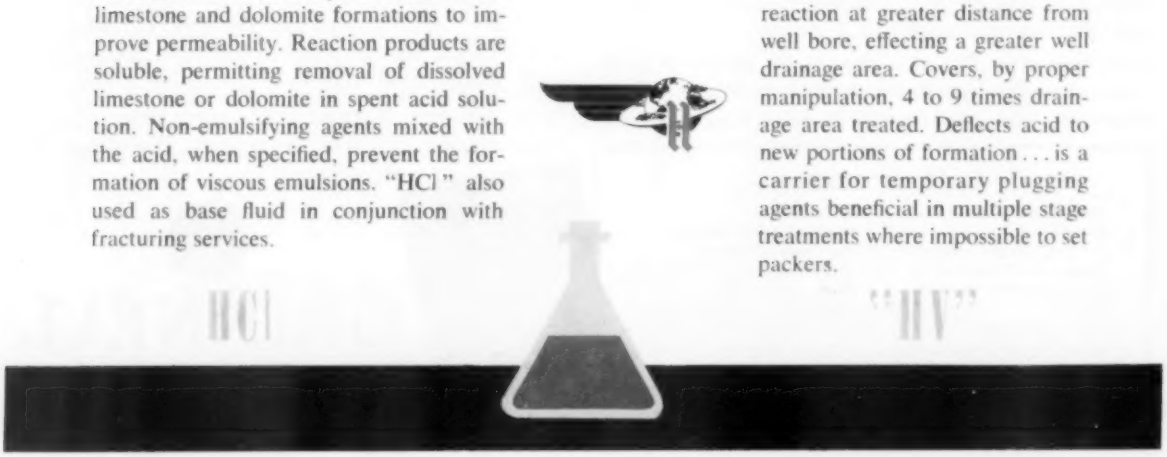
Make Possible Greater Combination Benefits

HYDROCHLORIC ACID

Used most effectively in treatment of limestone and dolomite formations to improve permeability. Reaction products are soluble, permitting removal of dissolved limestone or dolomite in spent acid solution. Non-emulsifying agents mixed with the acid, when specified, prevent the formation of viscous emulsions. "HCl" also used as base fluid in conjunction with fracturing services.

"HV" (HIGH VISCOSITY) ACID

Developed to provide acid reaction at greater distance from well bore, effecting a greater well drainage area. Covers, by proper manipulation, 4 to 9 times drainage area treated. Deflects acid to new portions of formation . . . is a carrier for temporary plugging agents beneficial in multiple stage treatments where impossible to set packers.



MCA (HALLIBURTON MUD CLEANOUT AGENT)

Exceptional cleaning and mud dispersing properties, make this one of the industry's most effective mud dispersant solutions. Used ahead of cement slurry in tight or open zones, extremely helpful in shut-offs. Cement is more firmly bonded to formation.

MCA

HOWCO HYFLO

An excellent emulsion breaker. Lowers surface tension of water and lowers interfacial tension between water and oil. Highly efficient when mixed with oils in removing water and emulsion blocks in producing formations. Easier and safer to handle because of non-corrosive quality.

HYFLO

HALLIBURTON DOC

A newly modified Diesel Oil Cement that is a "water-selective thickener". The slurry stays fluid until it contacts water and thickens suddenly at the interface becoming a heavy paste that blocks any water inflow. Water-selective feature makes "DOC-jobs" economical since smaller volume of slurry is needed. Final set product has superior qualities in density and durability; has high compressive strength and is impermeable to well fluids. In water entry problems, Halliburton DOC – Diesel Oil Cement – is *dependable* for water shut-off.

DOC

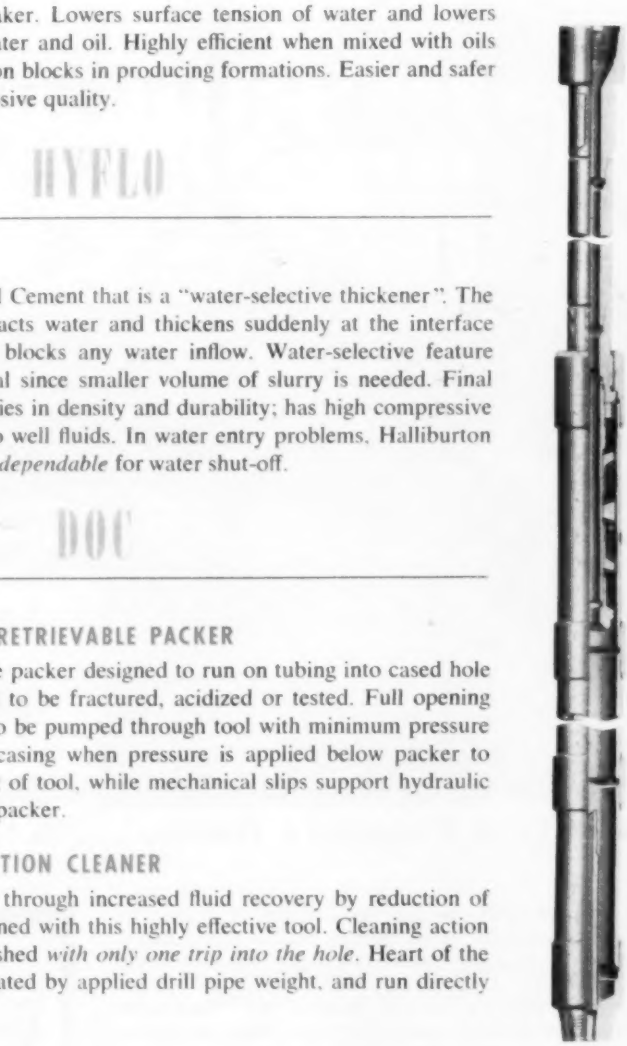
HALLIBURTON TYPE "HM" RETRIEVABLE PACKER

A retrievable hook wall type packer designed to run on tubing into cased hole providing a seal above section to be fractured, acidized or tested. Full opening permits large volume of fluid to be pumped through tool with minimum pressure drop. Hydraulic slips engage casing when pressure is applied below packer to prevent any upward movement of tool, while mechanical slips support hydraulic load of pressure applied above packer.

HALLIBURTON ACID FORMATION CLEANER

Better formation evaluation through increased fluid recovery by reduction of well bore damage can be obtained with this highly effective tool. Cleaning action and formation test is accomplished *with only one trip into the hole*. Heart of the Cleaner is the acid pump operated by applied drill pipe weight, and run directly above Hydro-Spring Tester.

TYPE HM RETRIEVABLE PACKER

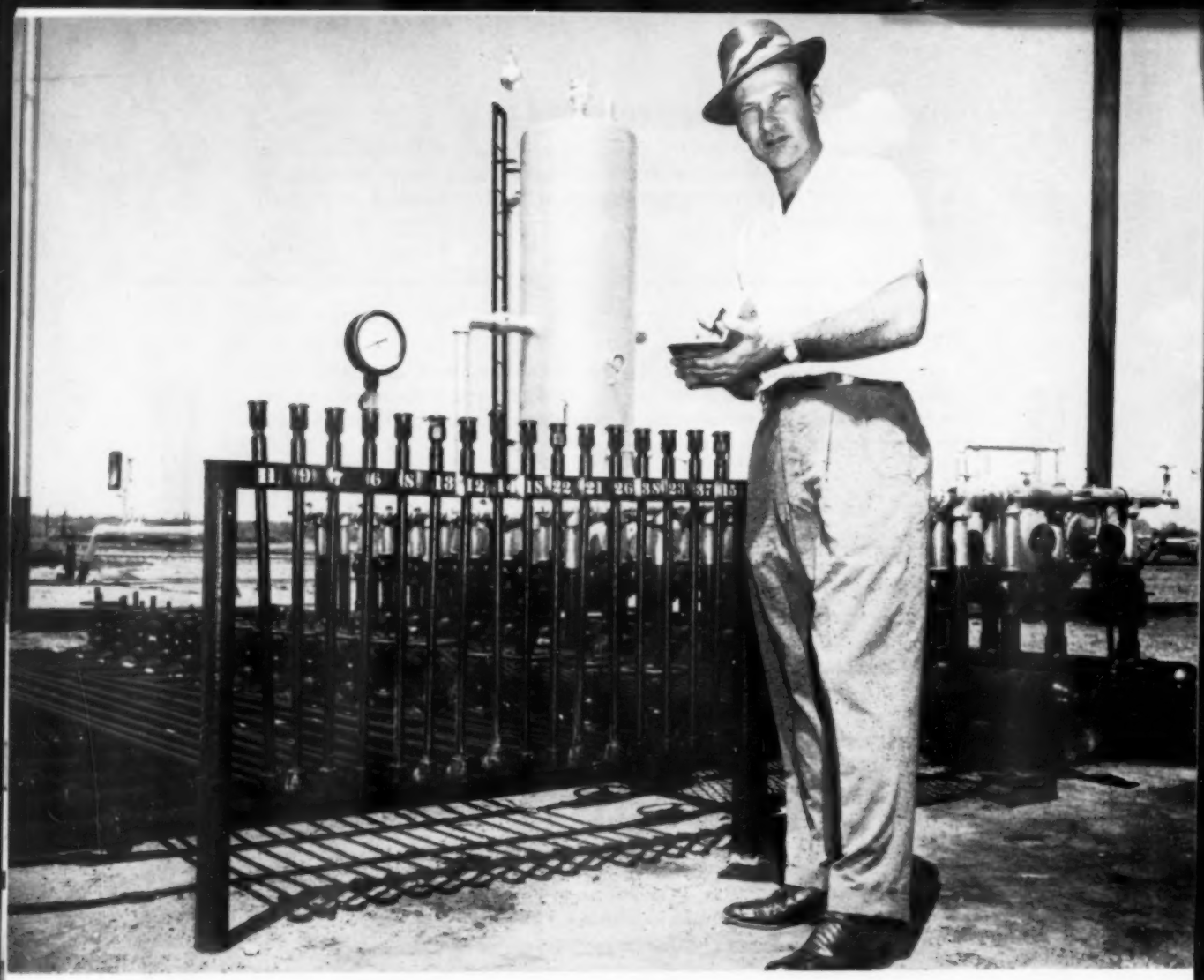


ACID FORMATION CLEANER

"CHEMICAL SERVICING... ANOTHER AID TO LONGER WELL LIFE"

HALLIBURTON
CHEMICAL SERVICES

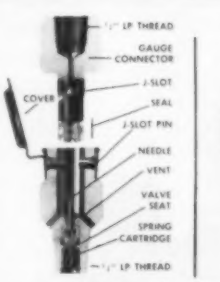
HALLIBURTON OIL WELL CEMENTING COMPANY
DUNCAN, OKLAHOMA



You Can Stand In One Spot And Gauge Sixteen Wells . . . With One Pressure Gauge . . . in 10 minutes!

It's no trick, and you can do it. Pictured above is a 16-well manifold at a central lease tank battery. Instead of separate pressure gauges for each well, the manifold is equipped with T-C Gauge Valves. A single pressure gauge, with a T-C Connector attached, is stabbed into each Gauge Valve to obtain a pressure reading. Just insert the connector in the valve, rotate 45 degrees, the valve opens automatically, and that's all.

For individual wells, instead of installing permanent gauges on tubing and casing, many operators are now using T-C Gauge Valves and Connectors. The first cost is lower, there's no gauge breakage—gauge repair costs are eliminated—and since the gauges are not exposed to the elements, you can be sure of accurate pressure readings.



Cross-section view of Gauge Valve and Connector.

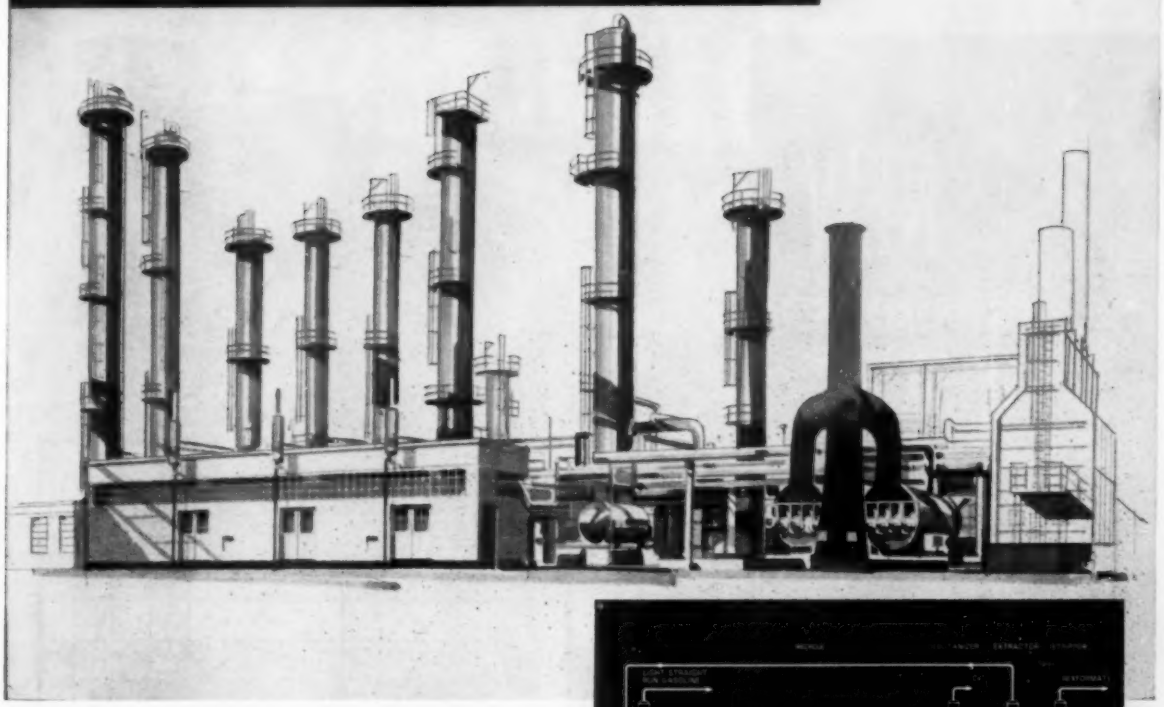
The Gauge Valve and Connector is widely used on Christmas trees.

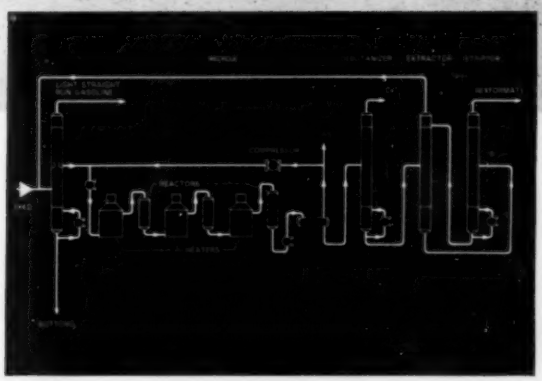
THORNHILL CRAVER CO.

UNIBOLT

P. O. Box 1184, Houston, Texas

Rexforming®





The ideal process to insure your top octane position

Here is the ultimate in reforming processes for the refiner who wants to insure maintaining his product's competitive advantage in the "octane race" and meet the fuel demands of high compression ratios in automotive engines. Rexforming produces gasolines of any required octane number even in excess of 102 Research from even the lowest quality feed stocks. This flexible process provides an excellent blending component and is of primary importance in helping create higher octane pool gasolines . . . a vital factor in profitable refinery operation. Rexforming assures efficient processing, too, because it employs distinctly mild conditions. It produces effective results through selective conversion of heavy, low-octane paraffins to aromatics and to lower-boiling, high-octane paraffins. Evaluate your present refinery operation with an eye to how Rexforming can substantially broaden your high-octane production and provide greater flexibility, greater efficiency and greater profit. Rexforming is one of a number of UOP refining and petrochemical processes available to all refiners, everywhere, for improving petroleum products and bettering refinery operating efficiency.

UOP®

UNIVERSAL OIL PRODUCTS COMPANY

30 ALGONQUIN ROAD, DES PLAINES, ILLINOIS, U.S.A.

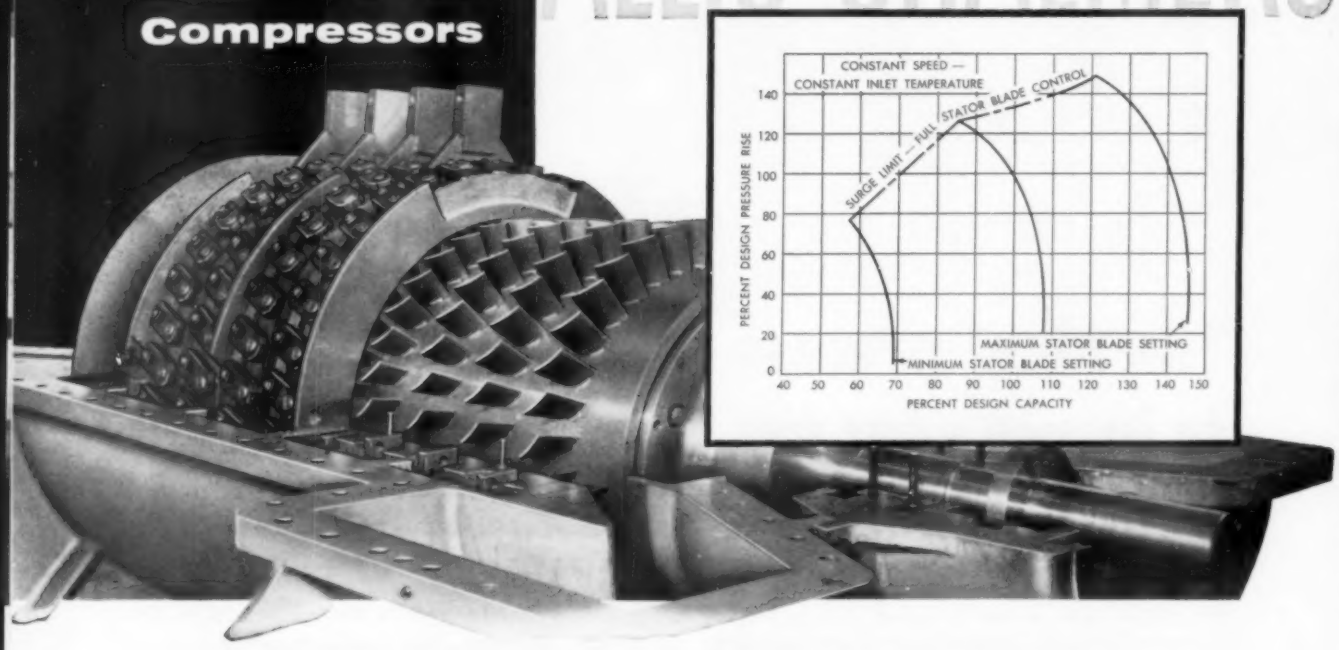
More Than Forty Years Of Leadership In Petroleum Refining Technology

Plan to stay ahead... MODERNIZE!

ALLIS-CHALMERS

NEW

Adjustable Stator Blade Axial Compressors



Get wide capacity range at high efficiency

With adjustable stator blade control, now available on Allis-Chalmers axial compressors, varying capacity needs can be met by merely changing stator blade settings — while the machine is in operation. Limited operating range need no longer be a problem.

In fact, Allis-Chalmers axial compressors can now be used with almost the same capacity variation as the centrifugal, while maintaining the axial's characteristic high efficiency and pressure rise at part load points.

For details on the adjustable stator blade axial compressor, call your nearby A-C office, or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin.

These additional advantages are inherent in axial compressor performance:

1. Because of the axial's wide range at constant speed, either steam turbine or motor drive can be used.
2. Small size, light weight of axial units cut space requirements, reduce foundation size and cost.
3. High compressor efficiency reduces horsepower required in driving an axial as much as 12%, compared with other compressor types.

ALLIS-CHALMERS A-C ALLIS-CHALMERS

A-5839

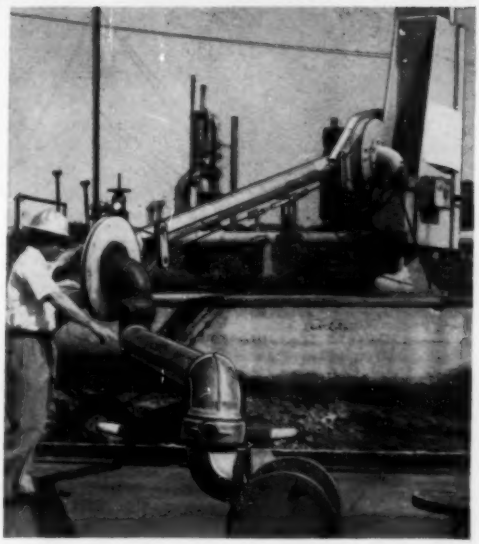
CHIKSAN

PREVENTS LINE HANDLING INJURIES
SPEEDS BARGE LOADING
ELIMINATES HOSE BURSTS
SLASHES REPLACEMENT COSTS

The Chiksan Barge Loading Arm ends hazardous manhandling of loading hoses, eliminates dangerous dock clutter. Mechanical operation makes hookup fast and simple.

Gear reduction enables one man to adjust the flange position anywhere in a 105° vertical range. Outboard arm is manually swung into position at any point in a 130° horizontal arc. The eight inch model rotates 360° to permit servicing barges on both sides of a narrow dock. Once hookup is made, the arm can be left unattended while free wheeling allows the unit to ride free during loading and unloading. When not in use, the arm is raised up and out of dockside traffic.

6″ x 25′ and 8″ x 28′ sizes available. Handle petroleum products, both black and bright, and mild caustics in any temperature ranging between —60° F. to +225° F. Service all river and lake barges and lake tankers including those in 25,000 barrel class.



The Chiksan Barge Loading Arm is designed to reach approximately 20 feet from dock riser to barge flange. Total length of Arm is 25 feet.

fmc CHIKSAN

A SUBSIDIARY OF
FOOD MACHINERY AND CHEMICAL CORPORATION

CHIKSAN COMPANY — BREA, CALIFORNIA
CHICAGO 5, ILLINOIS • NEWARK 2, NEW JERSEY

Well Equipment Mfg. Corp. (Division), Houston 1, Texas
Subsidiaries: Chiksan Export Company
Chiksan of Canada, Ltd.

58-36

CHIKSAN COMPANY
330 No. Pomona Ave., Brea, Calif.

Please send me your Barge Loading Arm Bulletin #456.

Name_____

Title_____

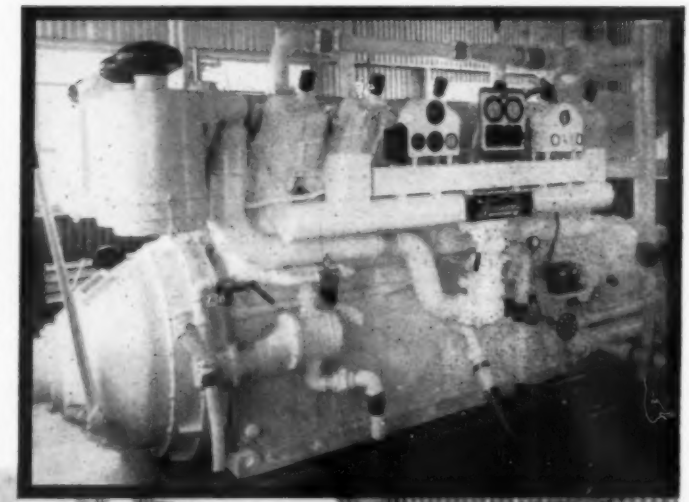
Company_____

Address_____

City_____ Zone____ State_____

LOADING 40,000 bbl. per hour into Super Tankers

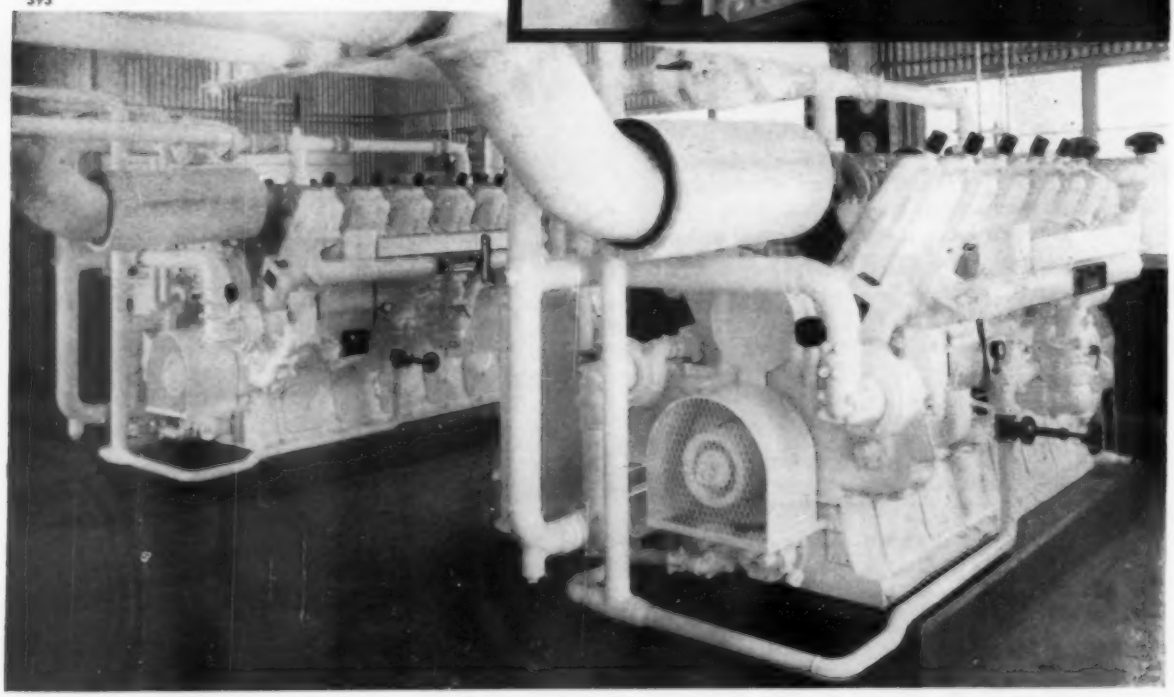
2 WAUKESHAS power the pumps



▶ At this station on the Mississippi River, super tankers are being loaded at what is believed to be the country's highest loading rate—40,000 bbl. per hour. Oil is pumped from 200′ diam. x 14′ high tanks through a 30″ line by two 3-stage Johnson vertical turbine pumps, each having a designed point of 17,500 bbl. per hr. at 196′ head. Driving each pump through Western gears, is a Model VLROBU Waukesha Gas Power Unit with a tremendously powerful, rugged 12-cylinder, high compression, overhead valve, 60-degree vee, four-cycle engine of 8½-inch bore and stroke, 5788 cubic inch displacement. Get Bulletin 1656.

WAUKESHA MOTOR COMPANY • WAUKESHA, WIS.
New York • Tulsa • Los Angeles

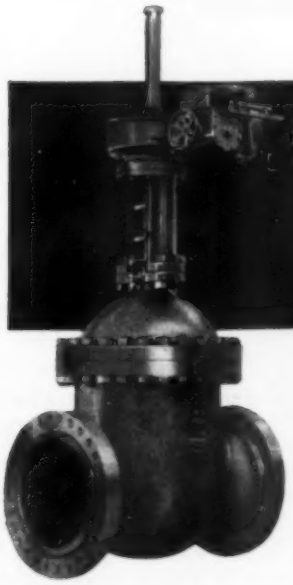
393



Check this DARLING gate valve trio for

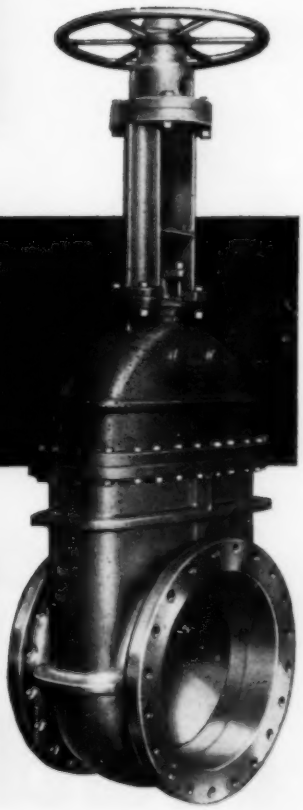
UNMATCHED ADVANTAGES

in every oil, gas and petrochemical service



DARLING FULLY REVOLVING DOUBLE DISC GATE VALVES

—famous for *consistently* trouble-free operation in all kinds of service. Revolving disc principle assures easy operation, surer closure, minimum friction, automatic seating compensation, extreme life with minimum maintenance. Ask for Catalog 57.



DARLING ALUMINUM ALLOY GATE VALVES

—featuring all the advantages of the above revolving disc principle, *plus* new economies in the handling of "problem" fluids and gases or wherever aluminum piping is used. Ask for Bulletin SLS 5801.

DARLING-McEVOY SELF-SEALING CONDUIT VALVES

—*the only* conduit gate valve with *sealant gasketing* between gates and seats. Every closure leakproof! This and other advantages proved by outstanding performance on major lines. Get *all* the facts. Ask for Catalog 57.

Whatever the service, in any phase of pipelining, gathering or processing, these Darling gate valves offer worthwhile features and advantages unobtainable in other valves. The catalogs referred to above are available to give you the pertinent facts.

DARLING VALVE & MANUFACTURING CO.

Williamsport 1, Pennsylvania

Manufactured in Canada by Sandilands Valve Manufacturing Co., Ltd., Galt 19, Ont.

DARLING

VALVES

KING SIZE

This giant 37 ton Cat Poly Reactor is one of 4 units shipped to a large petroleum refinery in the State of Washington. It is 4'-3½" in diameter by 32'-0" long and has a 1 3/16" thick shell. Each of its 8" thick heads is attached to the shell channel with 28 special alloy stud bolts 2¾" diameter by 15¼" long having nuts 4¼" across the flats. Into the 5¾" thick tube sheets 190 tubes, 2½" O. D., No. 5 gauge and 30'-0" long, are rolled and seal welded. Designed for 1,230 lbs. pressure on the tube side, the reactor was completely X-rayed and stress relieved.

Vogt, a leading builder of shell and tube reactors for poly plants, has the competently skilled personnel and modern mechanical facilities with which to provide heat transfer equipment for the most exacting services in petroleum refineries, chemical plants, and related industries.

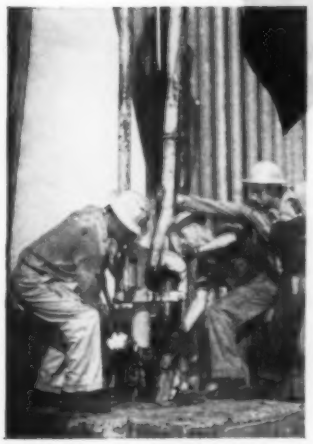
Reactors ...by Vogt

A bulletin describing the wide range of heat transfer equipment built by Vogt is available upon request.

Dept. 24A-XO

HENRY VOGT MACHINE CO., LOUISVILLE, KENTUCKY

BRANCH OFFICES: NEW YORK, CHICAGO, CLEVELAND, DALLAS, PHILADELPHIA, ST. LOUIS, CHARLESTON, W. VA.



MORE WAYS THAN ONE

TO BE AN OIL MAN

Ask the toolpusher what he is, and he says he's an oil man. Ask the mud dealer, the wire line operator, the supplier. Ask the tool rental man, ask the man 'dozing the slush pits, the drilling contractor, the producer. They are all oil men. And the oil industry depends on all of them and many more.

The Oil and Gas Department of The National Bank of Commerce of Houston has helped and is helping all of these oil men. The Commerce can help you because it knows what it's talking about, and, even more important from your point of view, it knows what *you're* talking about. If you are planning to drill, if you are planning to extend needed services, if you are in the oil business, you'll find that The National Bank of Commerce will help you all the way.

E. O. Buck, *senior vice president*
Oil and Gas Department.

THE NATIONAL BANK OF

COMMERCE

OF HOUSTON

GULF BUILDING MAIN AT RUSH HOUSTON

Facilities of the Oil and Gas Department of The National Bank of Commerce of Houston are available in Wyoming, Nebraska, Colorado, New Mexico, Louisiana, Mississippi, and Texas.

MEMBER
FEDERAL
DEPOSIT
INSURANCE
CORPORATION

This Tube is Precision Bored to Rifle Barrel Accuracy

Ashcroft Duragauge in Phenol case — a tough, rigid plastic turret type case for wall or flush mounting.

The Bourdon tube in Ashcroft Duragauges is machined mirror-smooth inside and finish ground outside to exact tolerances. Strong, uniformly thick walls assure precise flexibility—sustained high accuracy and long life.

Eight tube materials permit you to select the best metal with sensitivity balanced by internal corrosion resistance. Whether your choice is phosphor bronze, an alloy steel, "K" Monel, a stainless steel or beryllium copper, metallurgical control is exact from ingot to finished tube. Socket and tip joints are welded or brazed, then stress relieved for highest strength and safety. "Whip testing" at pulsating pressures at least 50% greater than rated pressure insures calibration stability.

Order your Ashcroft Duragauges with the best Bourdon tube material for your service. Choose the all-stainless-steel movement or stainless steel with nylon bearings and pinion gear. Full range of pressures, dial sizes, case designs and materials available. In any combination of components, Duragauges give sustained high accuracy and long service. Get details from your industrial supply distributor.

MANNING MAXWELL & MOORE TRADE MARK

ASHCROFT PRESSURE GAUGES

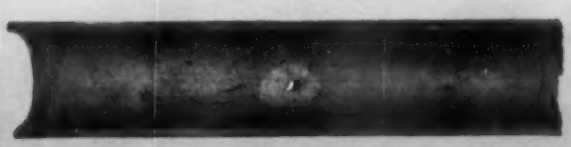
A product of

MANNING, MAXWELL & MOORE, INC.

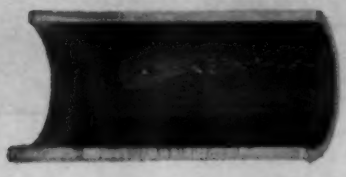
Consolidated Ashcroft Hancock Division • Stratford, Connecticut

In Canada: Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario

TUBOSCOPE CUTS PRODUCTION COSTS



NEW SONOSCOPE INSPECTION OF USED TUBING



Detects Even Minute Corrosion Pitting

Gives Quantitative Results

100% Coverage of Tubing Wall

Sonoscope® inspection is the most accurate method of locating pitting, corrosion, and other faults on both inside and outside surfaces of used tubing. Tubing need not be cleaned for inspection. Inspection is performed at your well site. From the Sonoscope log, tubing defects can be more accurately evaluated than previously possible by non-destructive methods. Re-use tubing with complete confidence. Call TUBOSCOPE

Tuboscope COMPANY

2919 HOLMES ROAD, HOUSTON, TEXAS

Write for additional information, Dept. 118, P. O. Box 808, Houston 1, Texas

Engineering Progress Report
FROM UNION CARBIDE CHEMICALS COMPANY

Prewashing of Refinery Gas Stream Reduces Diethanolamine Fouling

Gas sweetening cost reduced by preventing contamination

Most refinery gas treating plants using diethanolamine to remove hydrogen sulfide have operated for years with little trouble. However, there have been some instances where the solution has rapidly become fouled.

Laboratory analyses and actual field investigations have revealed that the formation of heat-stable salts is frequently a major contributor to solution fouling. Research has further shown that the formation of these salts can often be controlled by prewashing the gas stream. CARBIDE's Technical Service Department has helped achieve maximum operating economy for many ethanolamine users.

THE EXISTENCE OF HEAT-STABLE SALTS

Estimates of diethanolamine losses in treating operations are based on the observation that the solution progressively declines in capacity to accept acid gases. Analytic procedures suggest that the diethanolamine is not being physically lost from the system by leakage, vaporization or entrainment, but is being converted to heat-stable salts. Examination of many used diethanolamine solution samples from customers' plants has confirmed the presence of heat-stable salts of organic acids such as formic and acetic.

$$DEA + HCOOH \longrightarrow DEA \cdot HOOCH$$

$$DEA + CH_3COOH \longrightarrow DEA \cdot HOOCCH_3$$

THE FORMATION OF OTHER SALTS

In some cases, hydrogen cyanide also enters the treating plant in the gas stream and is combined with diethanolamine as a soluble salt in the absorber section, as are carbon dioxide, hydrogen sulfide, and other acidic components. Analyses of used plant solutions has confirmed the presence of ferrocyanides. It appears likely that they are formed by one or both of the following reaction routes.

1. $Fe(HCO_3)_2 + 6\ DEA \cdot HCN \rightleftharpoons 2DEA \cdot HCO_3 + (DEAH)_4Fe(CN)_6$

2. $Fe + 2H_2O \longrightarrow Fe(OH)_2 + H_2$

$Fe(OH)_2 + 2HCN \longrightarrow Fe(CN)_2 + 2H_2O$

$Fe(CN)_2 + 4HCN \longrightarrow H_4Fe(CN)_6$

$H_4Fe(CN)_6 + 4DEA \longrightarrow (DEAH)_4Fe(CN)_6$

PREVENTION OF SALT FORMATION

It is possible to minimize the contamination of amine solutions from organic acids by prewashing the gas stream with an alkali solution or water.

In an alkali prewash, some of the caustic will be converted quickly to sodium acid sulfide and sodium sulfide (or the corresponding carbonate salts) by the hydrogen sulfide (or carbon dioxide) in the gas. Nevertheless, the solution will still remove formic and acetic acids since these stronger acids will replace the weaker sulfides and carbonates.

Caustic solutions may not be as effective in removing hydrogen cyanide as they are in removing formic and acetic acid from gas streams rich in hydrogen sulfide or carbon dioxide. This is because the sulfides and carbonates replace the weaker cyanides. The high water solubility of hydrogen cyanide (and the relatively low solubilities of hydrogen sulfide and carbon dioxide) makes water washing an alternate method of hydrogen cyanide removal.

Prewashing not only reduces fouling of the diethanolamine but is also beneficial because the contaminants that are removed may sometimes promote corrosion.

FURTHER STUDIES

Union Carbide Chemicals Company is continually engaged in research designed to improve the products and processes of the gas conditioning industry. The results of this research are readily available to the industry from CARBIDE's Technical Service Department. If you would like more information on CARBIDE's Technical Services to the gas treating industry, call our nearest technical representative or write, Union Carbide Chemicals Company, Room 328, Department B, 30 East 42nd Street, New York 17, New York.

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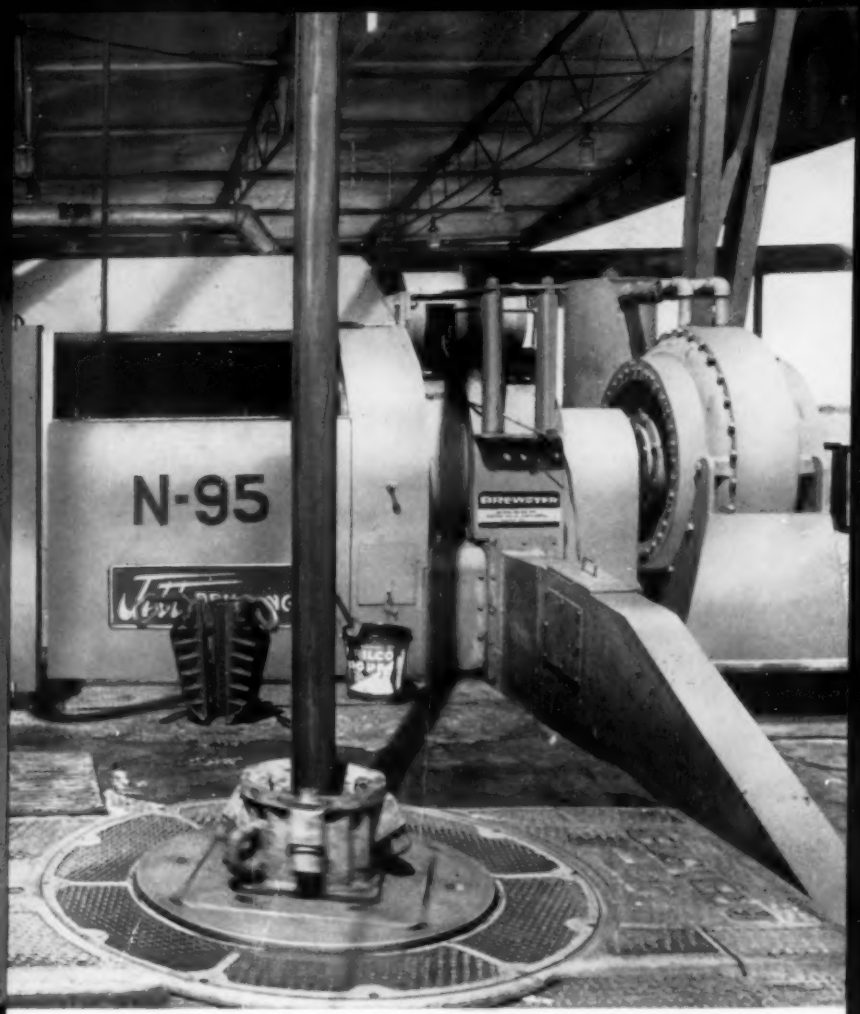
UNION CARBIDE CHEMICALS COMPANY
DIVISION OF
UNION CARBIDE
CORPORATION

BREWSTER N-95 DRAWWORKS



JETT DRILLING COMPANY, INC. Rig 110 with a Brewster N-95 drawworks is now on its third 14,000-foot well.

RUGGED IRON

Two-Fisted Tough

You hear Brewster customers everywhere use this phrase when they describe the Brewster N-95 drawworks. From pump drives to drum it has been designed to take it on the chin and come up ready for even tougher going. Rated for 12,000-foot plus drilling, the N-95 has the reserve power to go on down profitably.

Flexible in design, the N-95 moves, operates economically and can be used on wells usually drilled by much smaller equipment. The drawworks is side skidded and can be separated from the compound by disconnecting one chain. The controls, auxiliary brake and drawworks move as a single unit without any disassembly.

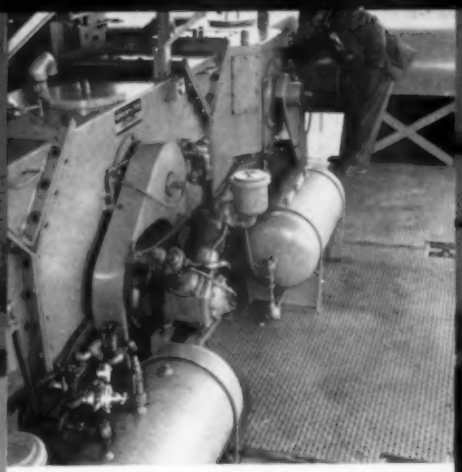
Brewster Drawworks are built to do the job for which they are sold . . . they're not little rigs "built-up" or big rigs "cut down."

EASY DOES IT . . . when it's a Brewster control panel. Full air operation plus simplicity in design leaves the driller free to follow the crew as they make a connection.

Check these exclusive features that you get ONLY when you buy a Brewster N-95 — (See next page)

BREWSTER

GOOD HOUSEKEEPING and good rig layout go hand in hand to make fast, safe and efficient operation on Jett Rigs.



HEAVY DUTY COMPOUND on the N-95 prevents wear on chain, bearings and engine couplings through positive alignment and rigidity.

SIMPLIFIED mud pump manifolding and clean layout are naturals with Brewster's dual in-line pump drive arrangement.

SCHEDULED MAINTENANCE means dependable operation. The crew here is subricating linkage on the big 46" hydromatic N-95 brakes.

JETT DRILLING COMPANY, INC.

RIG 110

One of 7 Brewster drawworks operated by Jett Drilling Company, Inc., of Shreveport, the N-95 on Rig 110 is now completing its 3rd 14,000-foot well. In all the Company is operating 12 rigs; three are leased and all others are Jett owned.

Jett Drilling's remarkable growth is firmly based on sound operating policy, good men and the finest available equipment. This is why the last two rigs purchased have been Brewster N-95's and why the rotary tables, swivels and blocks are all Brewster matched equipment.

BREWSTER N-95

THE BREWSTER COMPANY, INC.
Shreveport, Louisiana

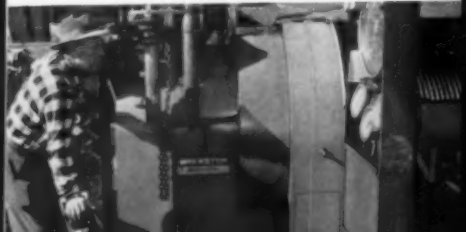
NON-SKID, flat surface of the Brewster 27-inch oil-bath table provides safe footing for the crew.

TOOLPUSHER, E. M. RODGERS takes over controls for a "first hand" check out on rig performance.

SUPPLY HOUSES

Howard Supply Company • Apex Equipment Company • Bovaird Supply Company • Industrial Supply Company • Murray Brooks, Inc. • United Supply and Manufacturing Company • Export Sales: The Brewster Company • (HOMCO) Houston Oil Field Material Company, New York, N. Y., Houston, Texas; Mexico City, D. F.

1200 horsepower is available to the driller from these three LRZBU engines.



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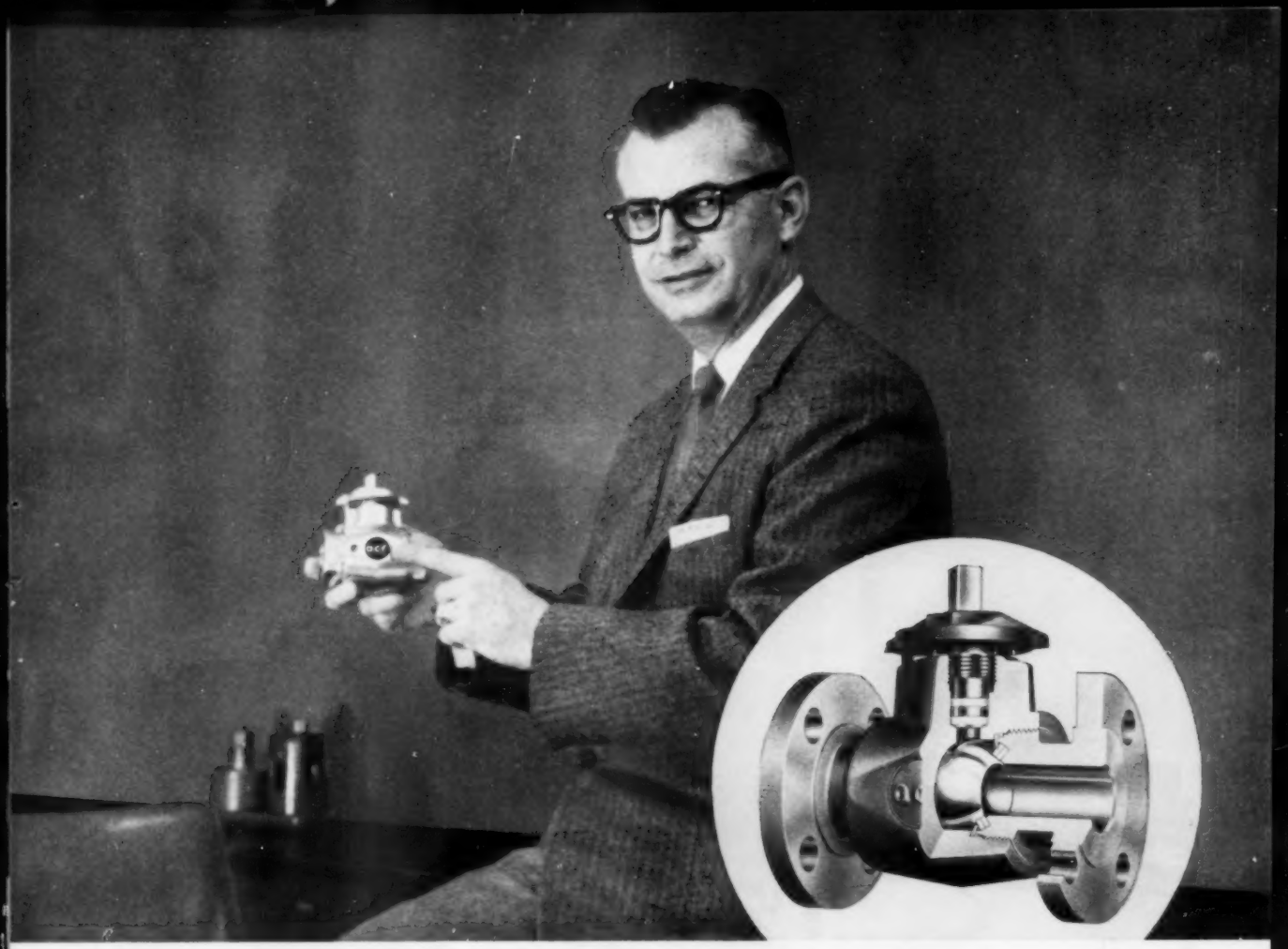

You should know more about the new ACF non-lubricated Ball Valve

Now, while you're thinking about it, ask your secretary to have us send you Catalog 1000.

This catalog will give you a full description of the latest product of W-K-M's creative engineering—the ACF non-lubricated Ball Valve.

This new valve was service-tested for 3½ years before it was offered to buyers. Service-*tested* and service-*proved*: in the entire 3½ years, every user reported completely satisfactory results.

It's a great valve, this new one: versatile, rugged, efficient, easy to maintain on those rare occasions when maintenance becomes necessary, a valve you can specify with complete confidence.

So send for Catalog 1000—you should know more about this *new* valve.

Product of W-K-M's *Creative Engineering*

This cut-away picture shows you why this new valve performs so dependably, lasts so long, and is so economical to maintain.

Note the full, round conduit through body and ball that assures full flow through the valve—without turbulence, and with no more pressure drop than through an equivalent length of pipe.

Note the way the ball is suspended between Teflon seats under compression, assuring leakproof service at rated working pressures, or under vacuum, indefinitely.

Note the way actual seating surfaces are sealed away and protected from any abrasive action of the lading flow in either open or closed position.

Available in carbon steel (ASA 150 lb., 300 lb.), and semi-steel (200 lb., 400 lb.). Sizes range from ½" through 6". See Catalog 1000 for full listing of sizes and pressures.

W-K-M

DIVISION OF ACF INDUSTRIES
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5817

MATCHLESS #5 STEAM HOSE

3 Men . . . 3 Applications
One Hose

Safety
U. S. Matchless #5 Steam Hose has been used at a Phillips Petroleum refinery* since 1930, for thawing and firefighting.

Easy Handling
Here U. S. Matchless #5 is being used to remove spilled oil.

Economy
Warehouse boss at Phillips Petroleum inspecting a length of U. S. Rubber Matchless #5 Steam Hose.

Men like to work with U. S. Matchless® #5 because it's so lightweight, so flexible. Ordinary hose is hard to handle, can't take much dragging around. But the hose that's readily available, lasts longer, and satisfies the operators is the best investment. That's U. S. Matchless.

When you think of rubber, think of your "U. S." Distributor. He's the best on-the-spot source of technical aid, quick delivery, and industrial rubber products.

*Okmulgee, Okla.

Mechanical Goods Division

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WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N.Y. In Canada: Dominion Rubber Company, Ltd.

for dependable rotation of your drilling string . . .

AMERICAN IRON KELLYS

HEX OR SQUARE

Yes, from rough forgings to finished boring and threading operations, dependability is built into American Iron Kellys every step of the way!

Correct forging processes plus straightness, joint alignment, concentricity of bore, hardness and precision threaded connections make American Iron Kellys better balanced for smooth running at all drilling speeds.

For dependability . . . and ability to do the job right . . . choose American Iron Hex or Square Kellys!

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Another AMF Product PETROLEUM EQUIPMENT

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518 North Indiana Avenue • Oklahoma City, Oklahoma
Subsidiary of AMERICAN MACHINE & FOUNDRY COMPANY

1000 BRINELL DURACASE TRIM...

Stops galling and erosion

Since the introduction of OIC's Duracase Trim, many forged steel valve specs are obsolete. This 13% chrome stainless steel trim with 1000 Brinell, case-hardened wedges and discs assures positive protection against even the simultaneous attack of the three valve-destroying agents—corrosion, erosion, galling.

OIC offers you a choice of two modern body-bonnet connections—union ring or bolted bonnet—on its entire forged steel gate, globe, angle, and check valve line.

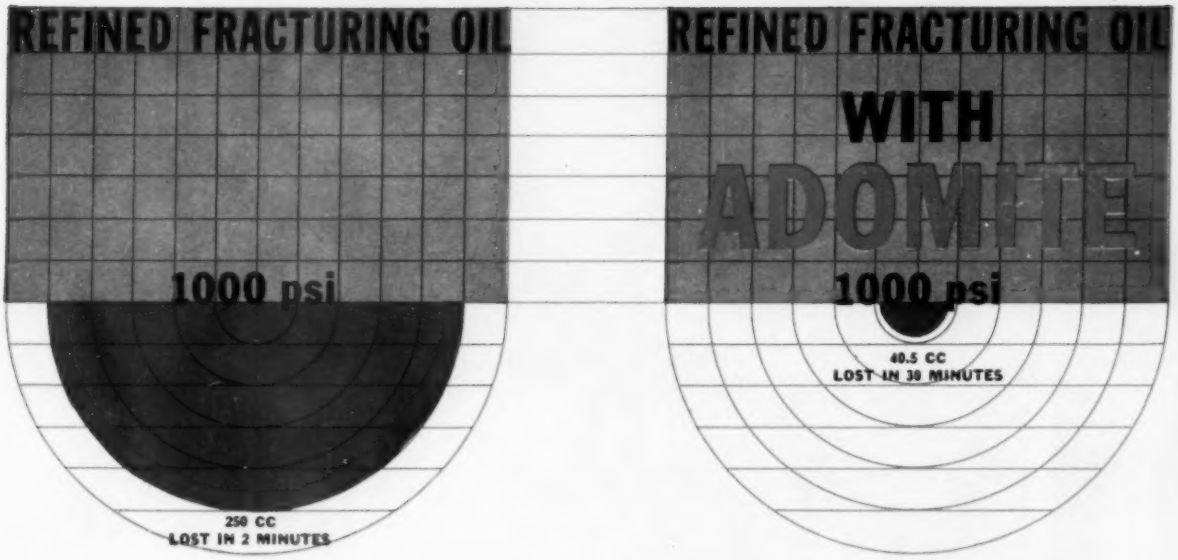
In addition, gate valves offer a choice of standard-flow or high-flow body ports, both with 1000 Brinell wedges.

Step up your valve requirements to the modern high-quality standards reflected in OIC valves. Include OIC on your next specification.

For OIC forged steel valve specification literature, write for Forms No. 195 and 195-R.

THE OHIO INJECTOR COMPANY • WADSWORTH, OHIO

OIC VALVES | FORGED & CAST STEEL, BRONZE & IRON VALVES



WHEN THE PRESSURE IS ON...

you DO need an additive for fluid loss control

At the higher pressures so often necessary in fracturing, Adomite is needed to control fluid loss to get the greatest fracture area possible. For instance, when using refined fracturing oil *without* Adomite, the fluid loss at 1000 psi is 250 cc in just 2 minutes. Imagine what it would be over a greater period of time. The chart shows the decided difference Adomite makes in the effectiveness of fracturing fluids. Fluid loss is cut to a minimum.

Adomite works by temporarily sealing the pores of the rock matrix. Adomite not only retains its stability under extreme pressures but also under the highest temperatures. With this better stimulation technique, you can fracture larger areas and reach untapped resources. Adomite leaves no permanent seal on the fracture wall or any evidence that the formation had ever been sealed . . . because it permits lower viscosity with lease crudes, greater injection rates can be attained.

For your next fracture or refracture job, you can be sure of better results by using Adomite to minimize fluid loss. Specify Adomite through your service company.

	Fluid Loss cc/30 Min. 100 psi	1000 psi
Crude Oil + Adomite.....	8.8	19.6
Gelled Crude Oil	22.0	Inf.
Gelled Crude Oil + Adomite..	6.0	16.5
Refined Frac. Oil.....	21.0	250/2 min.
Refined Frac. Oil + Adomite..	18.0	40.5

For more information, contact one of the individuals in your area . . .

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Mutual 4-7411

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Casper, Wyoming
Phone 3-3721

R. W. Hughes
Oklahoma City, Oklahoma
Central 2-1371

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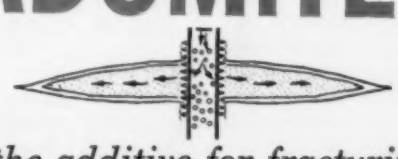
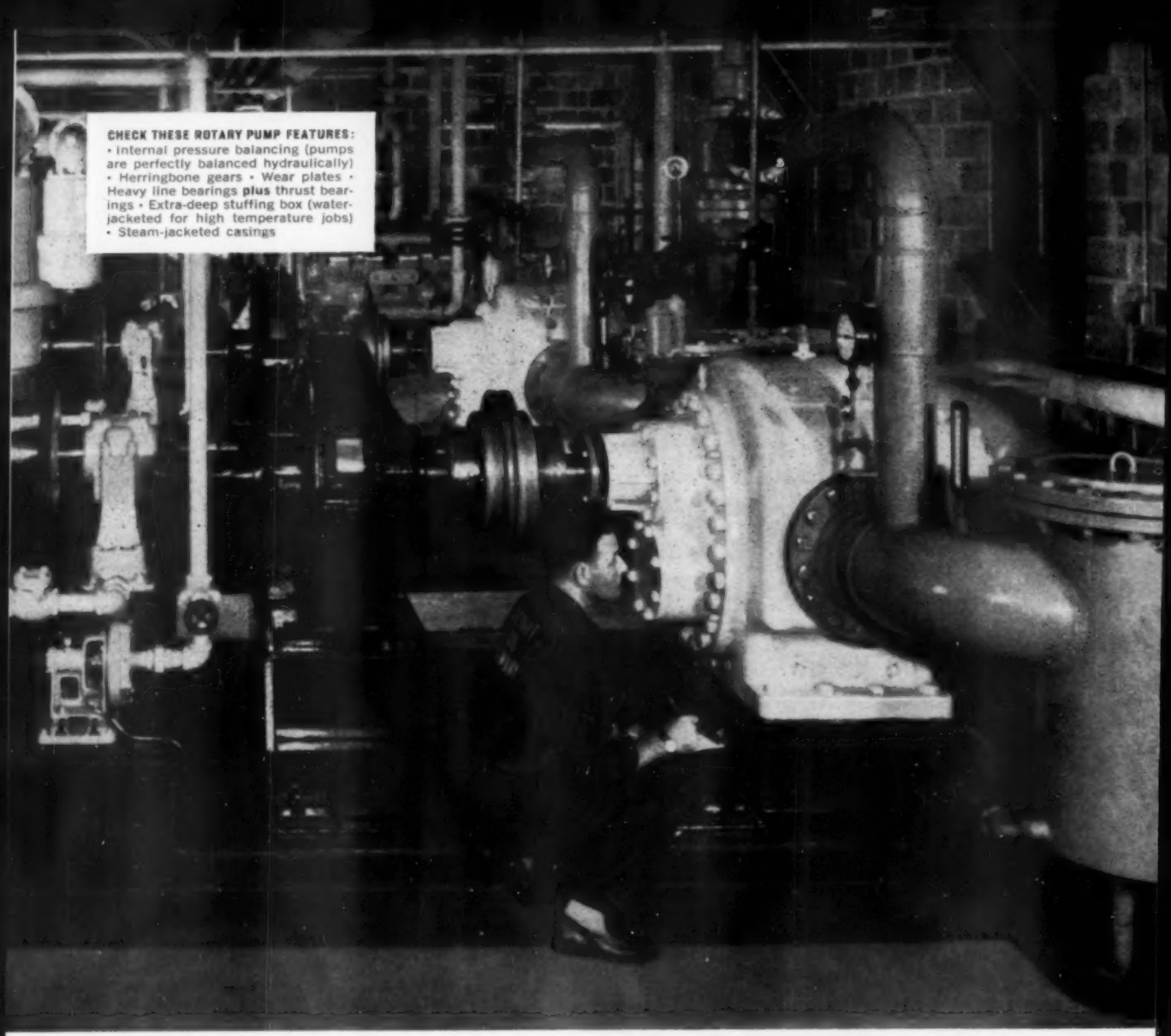
ADOMITE®



...the additive for fracturing!

©1958, Continental Oil Company


CHECK THESE ROTARY PUMP FEATURES:
• Internal pressure balancing (pumps are perfectly balanced hydraulically) • Herringbone gears • Wear plates • Heavy line bearings **plus** thrust bearings • Extra-deep stuffing box (water-jacketed for high temperature jobs) • Steam-jacketed casings

THE PUMP THAT PAYS FOR ITSELF

Greater efficiency, power savings make rotaries the pumps to use for medium and high viscosity service.

It's true rotary pumps cost a bit more than centrifugals . . . about 25% more. But that's purchase price only. You can quickly make up this higher first cost by applying rotaries on jobs they've been designed for. Such jobs are high-capacity oil transfer in tanker loading, gathering, or tank farms. As a matter of fact, you can even save so much the rotary will pay for itself!

True? Of course. Take this typical example. On medium viscosity crude oil a centrifugal pump might have an efficiency of 50%. A rotary pump performing the same service might have an efficiency as high as 80%, thus requiring *60% less power*. And electric power saving isn't all.

Rotary pumps are self-priming, and operate under very low absolute suction pressure throughout entire viscosity range. This means rotary pumps have low required Net Positive Suction Head (NPSH). They have the same high-speed smooth flow of a centrifugal pump, too, but have positive displacement. That is, they eliminate pulsating flow. And *only Worthington* makes rotary pumps as large as 16 inch suction and discharge. Ask your nearest Worthington representative for the full rotary pump story. Or, if you prefer, write to Worthington Corpoi tion, Section 20-4, Harrison, N. J. In Canada, Worthington, Ltd., Brantford, Ontario.

WORTHINGTON

For Dual String Completions – Flowing or Pumping

Use GUIBERSON'S RETRIEVABLE TYPE RD PACKER

Type RD Packer with Anchor and Plain Stinger

This cleanly designed, rugged packer is an outstanding Guiberson development for dual string installations in wells of any depth.

Outstanding in performance because it operates perfectly with both zones flowing, high or low differential pressure; with either zone flowing, the other zone pumping; with both zones pumping; with either or both zones on gas lift; or for multi-zone injection — gas or water.

Outstanding in advantages because it completely isolates each zone from the other and from the casing; provides full opening long string to lower zone; permits either string to be pulled or run separately.

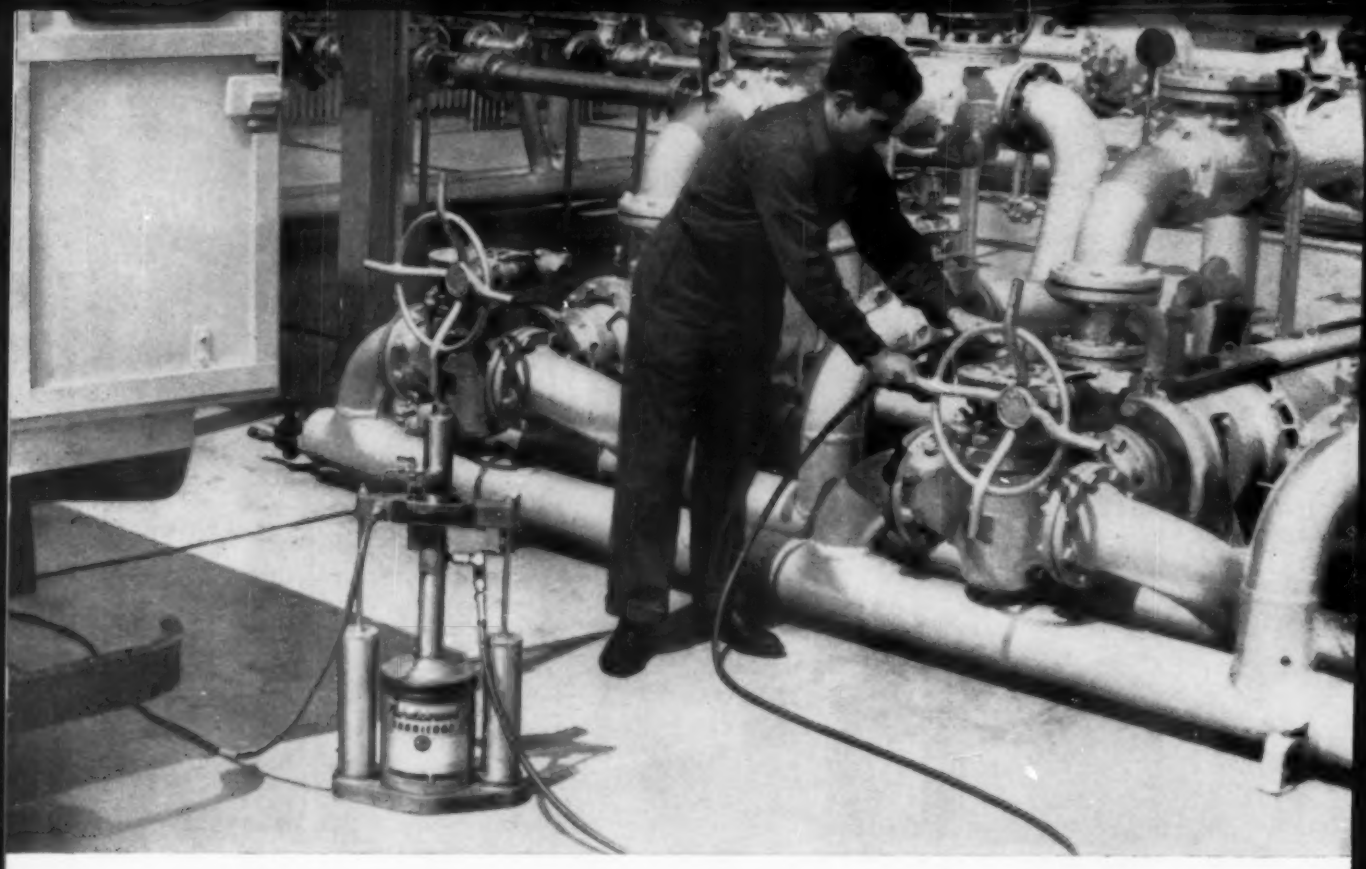
Guiberson's RD packer does complex dual zone jobs so well that operators tell us it's their best investment for dual string production. Ask your Guiberson representative about installation and auxiliary equipment recommendations.

Guiberson's RD packer has smooth operating dovetail slips of heat-treated alloy steel. Packing rubber is one-piece sleeve type — will not vulcanize in the well, made of Guiberson's special oil and gas resistant compound. You can get the RD packer with or without anchor, and a choice of stingers, plain or with snap-ring. Piston slips have extra large gripping area, are heat-treated alloy steel and keyed to anchor body up to maintain proper alignment. Get the Best - Get Guiberson.

THE GUIBERSON CORPORATION

ESTABLISHED 1919
DALLAS, TEXAS
- U. S. A.

Sold by Oil Field Supply Stores Everywhere



How valve lubrication

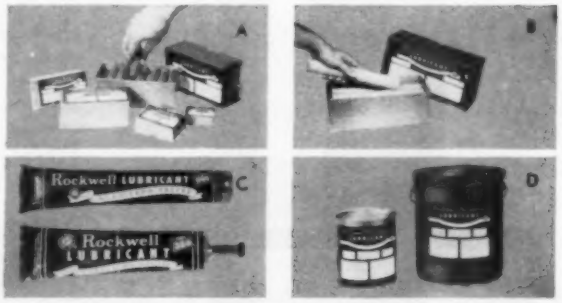
SAVES MONEY

For over forty years, operation cost studies have proved that Rockwell-Nordstrom lubricated plug valves perform better, yet cost far less to use, than ordinary valves. Here's why:

THE FUNCTION OF LUBRICANT is not just to make operation easier, but to form a leakproof, positive seal between the plug and valve body. Pressurized lubricant in the Sealdport grooves is actually a kind of "soft seat" that is instantly replaceable . . . it can't be *permanently* cut, worn or scratched like metal seats. Addition of new lubricant to a Rockwell-Nordstrom valve is like reseating an ordinary valve but it costs pennies instead of dollars.

Lubricant has another *very* important job in a Rockwell-Nordstrom valve. Acting as a "hydraulic" jack the pressurized lubricant provides a means of instantly unseating and freeing the plug . . . even after years in an open or closed position.

In any mechanism with moving parts, lubrication prevents wear and reduces friction. That's why Rockwell-Nordstrom valves work easier, stay in service longer and cost less to use. The information that follows shows equipment that will help you lubricate your valves more efficiently and at lower cost.

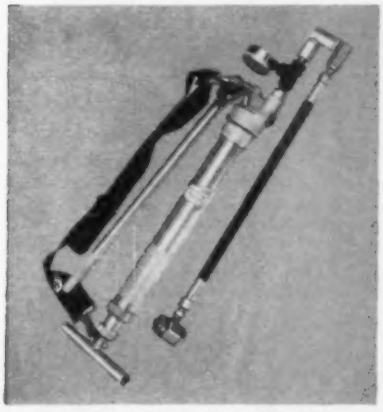


WORLD'S MOST COMPLETE LINE OF LUBRICANTS. Rockwell is the largest and oldest manufacturer of lubricated plug valve lubricants. Each lubricant is a result of painstaking research and careful field testing. A complete list of lubricants and the services for which they are recommended is available . . . use the coupon on the facing page.

The lubricant types illustrated above are (A) Stick Lubricants for manual insertion. (B) Stick Lubricants for lubricant guns, for fast, easy lubrication through the Rockwell fitting on the valves. (C) Gun Tubes for fast refilling of lubricant guns and convenient bulk tubes (spout type) for individual valve lubrication. (D) Bulk Lubricants in five quart and five gallon pails.

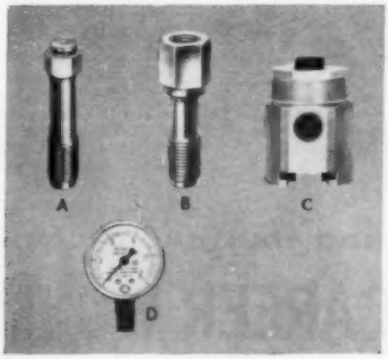
HAND LUBRICATION of a few small valves is done easily by unscrewing the Rockwell fitting with any standard wrench and inserting Rockwell stick lubricant. Screwing down the fitting creates proper lubricant pressure.

ROCKWELL HIGH PRESSURE HYDRAULIC HAND GUN is used at installations similar to those recommended for the booster gun. The Hydraulic Gun develops much higher lubricant pressures with less manual effort making it suitable for lubricating larger valves.



ROCKWELL BOOSTER HAND GUN provides high pressure lubrication for small or medium sized valves at installations where a moderate number of valves are to be maintained. Quickly loaded with stick lubricants, the hand gun is fast, easy to operate and insures proper lubricant pressure witnin the valve.

ROCKWELL HYPREGUN saves time and labor at large valve installations especially where there are numerous large valves. The Hypregun is a compact, self-priming air operated lubricant bucket gun. Using 5 qt. pails of lubricant, it's easy to properly service the largest valve installations.



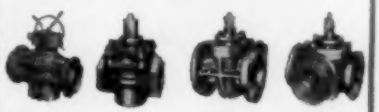
LUBRICATION ACCESSORIES. Just a few of the lubrication accessories available from Rockwell are shown above. The Rockwell Fitting (A) is now standard on all valves. The drilled and tapped lubricant screw (B) makes a convenient fitting for use with pressure gauges or gun fittings. The Rockwell 400 giant button head coupler (C) has a built-in shut-off to eliminate lubricant extrusion from residual pressure in the hose (the "400" is standard on all Rockwell guns and pumps). Pressure gauges (D) for hand guns and bucket pumps tell *automatically* when correct lubricant pressure is reached . . . also indicate when valve needs further gland adjustment.

How to Select Rockwell-Nordstrom Valve Lubricants

Complete details on the proper lubrication of Rockwell-Nordstrom valves and the proper lubricant formula number for a wide range of services are detailed in Rockwell Bulletin V-220. Generally, the following information is vital to the selection of the proper lubricant:

1. Precise description of the line material to be valved.
2. Temperature range to which valve will be subjected.
3. Pressure range within which the valve will work.
4. Size and type of Rockwell-Nordstrom valves.
5. Frequency of operation.
6. Type of lubricant (stick, gun tube, pail or bucket) to be used.

Rockwell's lubricant research staff will be pleased to give special attention to operating problems not specifically covered in the literature.



ROCKWELL-Nordstrom VALVES

it's ROCKWELL MANUFACTURING COMPANY

Rockwell Manufacturing Company
Pittsburgh 8, Pa.

☐ Please send me Rockwell Bulletins V-218 and V-220.

☐ Please have your sales representative call to discuss specific problems.

Name_____

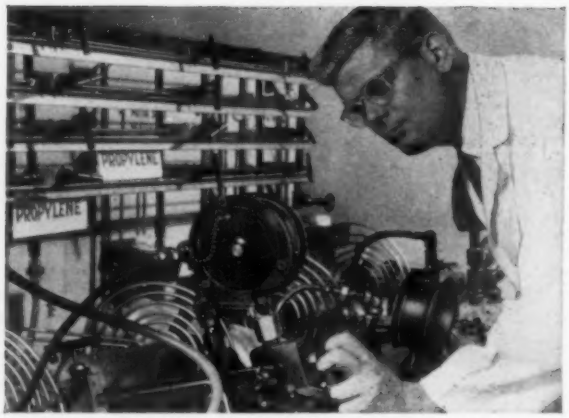
Address_____

City_____ Zone_____ State_____

Bob Cleland, Standard sales representative (left), and I. G. Smallegan, plant manager.

Would you like to be a salesman?

Do you enjoy the thrill of selling against strong competition? Would you like to be in a field where opportunities are limitless? Many of America's most successful executives started as salesmen. They rose to their present heights because the bedrock of American business is competition and the bedrock of competition is selling. At Standard Oil, salesmen are given a sound background. They spend weeks as salaried sales trainees, learning the methods of successful selling.



Dr. Omar Juveland, chemist in Standard's laboratories at Whiting, Indiana.

Would you like to be a scientist?

Here is a field of constantly increasing importance, offering endless opportunities. In the last 10 years alone, Standard Oil Company and affiliates have added or rebuilt 20 laboratories. And the number of scientists has been more than doubled. Standard scientists are widely known for inventions and discoveries that have benefited car owners, industry and national oil conservation. They often help on scientific projects of highest importance to national security, such as atomic research.

If you had your choice now,

WHAT KIND OF CAREER WOULD YOU LIKE?

Nugent T. Brasher (left) and Dearal W. Beddo, geologists for Pan American Petroleum Corporation, a Standard affiliate.

Would you like to be an explorer?

The search for oil is one that never ends. And with the world depending more and more on oil, the search goes on at an ever-increasing tempo on land and sea with complicated and costly equipment. Work such as this makes for exciting, adventurous careers at Standard Oil and its affiliated companies. And it is work that provides an extra measure of satisfaction, for it is of utmost importance to the future of our country.

L. Van Paris Jr., Standard Oil dealer at South Bend, Indiana.

Would you like to be in business for yourself?

Do you like the idea of being an independent businessman? If you do, the service station business offers great opportunities. Many Standard Oil dealers, for example, not only are successful businessmen, but are civic leaders, too, serving as mayors, city councilmen and in other capacities. They will tell you that being in business for yourself provides personal satisfaction and financial rewards seldom equalled in other endeavors.

What makes a company a good citizen?

One measure is a company's progressiveness, its ability to change and grow, to adapt itself to new and better methods. The result is better service and better products for customers. And in such a growing, progressive company, there is opportunity for employees to advance. We at Standard Oil are proud of the fact that most of our officers and directors, since this company started, have come up through the ranks.

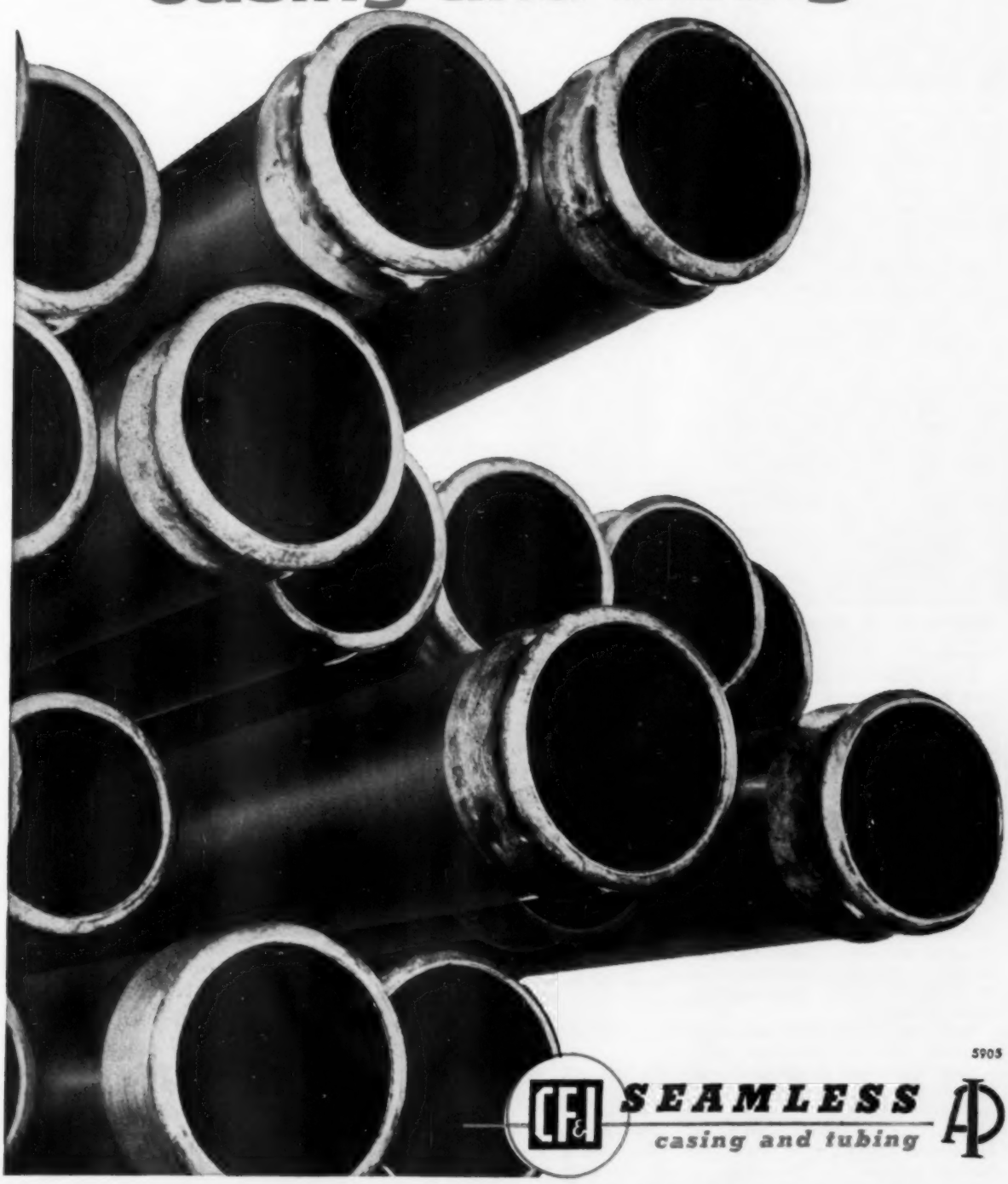
STANDARD OIL COMPANY (INDIANA)

STANDARD

THE SIGN OF PROGRESS...
THROUGH RESEARCH

CF&I

quality seamless casing and tubing



5905

CF&I SEAMLESS casing and tubing

THE COLORADO FUEL AND IRON CORPORATION • DENVER, COLORADO

They Say—

Mountain comes to Mahomet

Dear Sir:

I was very pleased to see your article on page 63 of the October 20 issue with respect to developments in Alaska. I was the attorney who put together the block of over a million acres on the Gulf of Alaska from Icy Bay to Cape Fairweather. The operating rights to this block are now jointly held by Colorado Oil & Gas, Continental, and Seagram's.

Since I am well acquainted with the geography of the area and the location of Colorado's third test, I was somewhat surprised to read that this test is "at Cape Fairweather on Yakutat Bay."

Cape Fairweather is at the southeastern end of the block and Yakutat Bay is in about the middle of the block. The Cape is more than 60 miles east and 42 miles south of the Bay. The wellsite is very close to the Bay, being located only a short distance from the Yakutat Airport.

Even Mahomet could not accomplish what you tried to do.

Jacob N. Wasserman
Attorney-at-law
Washington.

Making U. S. oil competitive

Dear Sir:

Your October 6 editorial on the need for constructive suggestions on the imports plan was well taken.

As you point out, the newest proposed solution, allocations based on refining capacity, is inequitable. It ignores property rights.

The historical basis of allocating quotas has been tried. It has failed because applications for new or increased quotas were handled without predetermined rules or standards.

It should be recognized that any allocation of imports is a temporary palliative measure. Such measures should disturb existing patterns as little as possible while a long-range solution is sought.

There are two possible long-range solutions. One is a protective tariff. A tariff big enough to protect all segments of the industry would cost the consumers billions, alienate other nations, reduce the export markets of our manufacturers and be against our national policies.

The other is to put the domestic producer on a competitive basis. As reported in your October 13 issue, many oil producers realize that the cost of production can be reduced by drilling only the minimum number of wells needed to recover the oil in place. Unitization and logical well-spacing rules would help a lot.

Congress could help tax wise. The 27% depletion allowance does not benefit the small producer who needs help the most because the amount may not exceed 50% of gross profit.

Finally, we should let the efficient U. S. producer compete by abolishing proration in accord with market demand. Market demand proration has failed in agriculture, the only other industry in which it has been tried. Spreading the wealth, or misery, through market proration makes us drill unnecessary wells in shallow fields and retards drilling the offshore regions and deep structures where large reserves may still be found.

It is, of course, true that abolition of market demand proration would hurt the owner of wells which are already producing at the maximum efficient rate. It might also hurt the producer who is uneconomically located. To avoid abandonment of marginal reserves, a subsidy might be paid the stripper.

The oil industry claims to believe in free enterprise, let's practice it. Let's find out if a free American oil industry can still compete in world markets.

George Gibson
Montclair, N. J.

Geography debate, anyone?

Dear Sir:

The sketch map of Luzon, Republic of the Philippines, shown in The Oil and Gas Journal of October 13, page 89, places the Pacific Ocean to the left of the island.

Should not the South China Sea be on the west side and the Pacific Ocean on the east?

John H. Rabbitt
Statistical Research Department
Sun Oil Co.
Philadelphia

(Editor's note: Reader Rabbitt is right, but so is the Journal. South China Sea is a more specific name for this area, but it can also be considered a part of the Pacific Ocean.)

Canada's refining mushrooms

"Canada need take a back seat to no nation in its refinery operations. The capacity of refining in Canada has tripled since 1946 (from 245,865 bbl. per day in 1946 to 789,550 bbl. per day at the end of 1957), and by the end of 1958 it is expected to reach approximately 825,000 bbl. per day.

"This year Canada's oil industry will spend about $120 million on the expansion and improvement of its crude refining facilities. If you add the total refinery investment program for the last 12 years, the figure is $800 million.

"Petroleum refining now ranks second in value of production among the leading manufacturing industries in Canada—exceeded only by pulp and paper."

E. D. Brockett, president, British American Oil Co., Ltd., in a speech at the dedication of BA's new Port Moody, B. C., refinery.

An unsound proposition

"In view of Imperial's record of developing markets for Canadian oil, many people may not understand why this company, in its appearances before the Borden Commission, did not support proposals to pipe crude oil across the continent from Alberta to Montreal.

"The answer is simple. The proposition isn't commercially sound.

"It isn't commercial because western Canadian oil piped to Montreal would cost more than present supplies. This means that such a pipeline could only operate behind a protective screen of import controls or subsidies that would cost the eastern consumer and the Canadian taxpayer money.

"It isn't sound because it is based on the assumption that the Montreal refiners would guarantee to take oil through the line for 20 years regardless of prices of oil from alternative sources. Only in this way could investors be induced to supply the money to build the line. In effect, Montreal refiners would be pledging their credit for up to $400 million, which is actually more than the total assets of all their plants in Montreal.

"It just doesn't make business sense to commit credit for some 20 years to a project that can't stand on its own feet and offers no long-term advantages to a company or its customers."

Editorial in the October issue of Imperial Oil Review, magazine of Imperial Oil, Ltd.

Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

CRADLING IN NEW YORK — Bechtel Corporation uses its MD7 for cradling operations on a steel gas line. The company has used Cat Pipelayers for a long time. They have enough reserve power to keep going under really heavy loads.

PIPELAYING IN CALIFORNIA — The MD7 lowers in a 16-inch steel gas line for Underground Construction Co. & Stolte Inc. "Cat-built Pipelayers are reliable and the 24-hour parts service we get is a big boon for us," says Project Engineer R. E. Hall.

DRILLING IN ARIZONA — Here Cape Construction Co. uses its MD7 for a drilling operation on a 24-inch crude oil line, running from Four Corners to Los Angeles. In rough going, pipe is being put in the ground at a rate of 2 miles a day. "We rely on Cat-built Pipelayers to get the job done," says Garland Mims, spread superintendent.

Wherever the pipe takes you, the MD7 is ready for action

The Caterpillar MD7 Pipelayer is an all-around machine that comes to *work*—and the harder the work the better.

This big yellow unit is used for unloading and stringing, pipelaying, cradling and—equipped with a bulldozer—can even help backfill. But just as important as the many jobs it can do is the deft, dependable way it handles them.

The MD7, with 128 HP at the flywheel, has a 54,200-pound lifting capacity. And it was engineered to take full advantage of its power. For instance, hydraulically actuated counterweights are available to quickly adjust the lifting capacity to job needs. And no matter how rough the going, seven-roller track frames and 22-inch track shoes can give the machine excellent stability and flotation. No matter how low the temperature, the MD7 will be ready to work when you are because of its positive, dependable starting. Its powerful diesel engine is pre-conditioned by a Caterpillar gasoline starting engine.

For precision work, hydraulic steering boosters give you the accuracy and dependability of manual control without the hard work.

These features have been engineered into the MD7 to help you cut costs. So see your Caterpillar Dealer for complete details. The quicker you see him, the sooner you will start saving money.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

STANDARD OF THE PIPELINE INDUSTRY

Let **PACIFIC** prove to you

...greater valve efficiency

You've seen them every day in every type of service that dictates rugged dependability and performance. From crude lines to high temperature service. From storage terminals to charging lines. On simple, manually operated units to the more complex remote stations... and in a host of sizes and pressure services that is characteristic of their flexible service applications.

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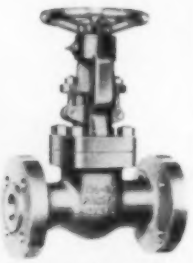
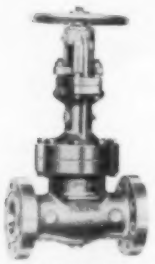


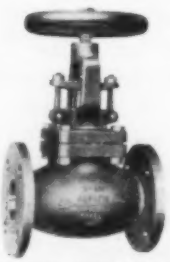
SMALL STEEL VALVES



CAST STEEL VALVES

LOX VALVES

ALUMINUM VALVES



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CALENDER

NOVEMBER

- **6** West Central Texas Oil and Gas Association, annual meeting, Hotel Wooten, Abilene.
- **5-6** Society of Automotive Engineers, national fuels and lubricants meeting, Mayo Hotel, Tulsa.
- **6-7** American Association of Petroleum Geologists, Pacific section annual meeting, Los Angeles.
- **6-7** Louisiana Polytechnic Institute, School of Engineering, seventh annual instrumentation conference, Ruston, La.
- **10** Transportation Club of the Petroleum Industry, annual meeting, Bismarck Hotel, Chicago.
- **10-12** American Petroleum Institute, thirty-eighth annual meeting, Conrad Hilton, Palmer House, and Congress hotels, Chicago.
- **17-18** New Mexico Oil and Gas Association, thirtieth annual meeting, La Fonda Hotel, Santa Fe.
- **18** Chemical Institute of Canada, chemical economics subject division, meeting on "The Canadian Chemical Industry—Export and Growth," Sheraton-Mount Royal Hotel, Montreal.
- **18-20** Ninth National Conference on Standards, Hotel Roosevelt, New York.
- **18-20** National Conference on Air Pollution, Sheraton-Park Hotel, Washington, D. C.
- **19-21** Society of Petroleum Engineers of AIME, Venezuela petroleum sections, Caracas, Venezuela.
- **20-21** American Society of Civil Engineers, structural division and Kansas City section, conference on electronic computation, Kansas City.
- **21** Natural Gasoline Association of America, Panhandle Plains regional meeting, Herring Hotel, Amarillo, Tex.
- **30-Dec. 5** American Society of Mechanical Engineers, annual meeting, Statler and Sheraton-McAlpin hotels, New York.

DECEMBER

- **1-3** Interstate Oil Compact Commission, annual meeting, Kansas City.
- **2-4** Asphalt Institute, annual membership meeting, Shoreham Hotel, Washington.
- **7-10** American Institute of Chemical Engineers, annual meeting, Netherland Plaza Hotel, Cincinnati.
- **9-13** National Association of Corrosion Engineers, University of Illinois, biennial short course on cathodic protection.
- **11-12** Mid-Continent Oil and Gas Association, annual advalorem tax forum, Hilton Hotel, Fort Worth.

JANUARY

- **22-24** Texas Society of Professional Engineers, annual convention, Shamrock Hilton Hotel, Houston.
- **23** Natural Gasoline Association of America, Oklahoma regional meeting, Biltmore Hotel, Oklahoma City.
- **28-29** Annual Midwest Welding conference, sponsored by Armour Research Foundation of Illinois Institute of Technology, and American Welding Society, Chicago section, Illinois Institute of Technology, Chicago.

FEBRUARY

- **1-6** American Society for Testing Materials, D-2 committee on petroleum

products and lubricants, Sheraton-Jefferson Hotel, St. Louis.

2-27 Southwestern Legal Foundation, short course on oil and gas law, Southwestern Legal Center, Dallas.

9-11 American Association of Petroleum Geologists, Rocky Mountain section, ninth annual meeting, Civic Auditorium, Albuquerque, N. M.

11-13 Southwestern Legal Foundation, tenth annual institute on the law of oil, gas, and taxation, Southwestern Legal Center, Dallas.

15-19 American Institute of Mining, Metallurgical, and Petroleum Engineers, annual meeting, Sir Francis Drake Hotel, San Francisco.

16-19 American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, forty-fourth annual meeting, Memorial Auditorium, Dallas.

24-25 University of Oklahoma, sixth geological symposium, Norman, Okla.

27 Natural Gasoline Association of America, Permian basin regional meeting, Scharbauer Hotel, Midland, Tex.

MARCH

9-11 Midwest Gas Association, annual meeting, Hotel Fort Des Moines, Des Moines.

16-18 Western Petroleum Refiners Association, forty-seventh annual meeting, Hilton Hotel, San Antonio, Tex.

19-20 New England Gas Association, annual meeting, Hotel Statler, Boston.

25-27 American Petroleum Institute, Division of Production, southern district meeting, Roosevelt Hotel, New Orleans.

APRIL

2-3 Society of Petroleum Engineers of AIME, Rocky Mountain petroleum section, Casper, Wyo.

2-3 American Institute of Mining, Metallurgical, and Petroleum Engineers, technical conference on stress corrosion, Mellon Institute, Pittsburgh.

5-10 American Society of Mechanical Engineers, nuclear congress, Cleveland Auditorium, Cleveland.

8-10 American Petroleum Institute, Division of Production, eastern district meeting, Penn-Sheraton Hotel, Pittsburgh.

14 Independent Oil Men's Association of New England, annual meeting, Hotel Statler, Boston.

14-16 Southwestern Gas Measurement Short Course, University of Oklahoma, Norman.

15-17 National Petroleum Association, semiannual meeting, Hotel Cleveland, Cleveland.

15-17 American Petroleum Institute, Division of Transportation, annual tanker conference, Jung Hotel, New Orleans.

19-23 American Society of Mechanical Engineers, oil and gas power conference and exhibit, Shamrock-Hilton Hotel, Houston.

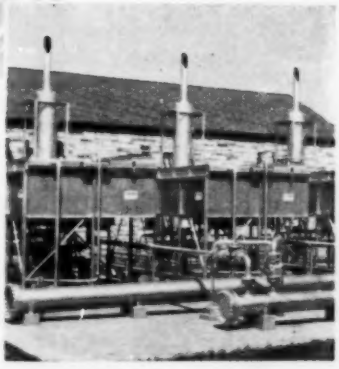
22-24 American Petroleum Institute, Division of Production, Mid-Continent district meeting, Herring Hotel, Amarillo, Tex.

22-24 Natural Gasoline Association of America, thirty-eighth annual convention, Baker and Adolphus Hotels, Dallas.

26-28 Texas Independent Producers and Royalty Owners Association, membership meeting, Baker Hotel, Dallas.

30-May 1 American Petroleum Institute, Division of Production, Pacific Coast district meeting, Biltmore Hotel, Los Angeles.

Putting a 50 Billion cu.ft. Genie Back in its Bottle is a Big Job!



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JOURNALLY SPEAKING

Nothing of Value

Out in the Oklahoma Panhandle the United States Government is spending millions of dollars to build a defense plant that will produce practically nothing.

In this day and age this information might be considered as coming under the classification of "no news," what with all the charges of waste and extravagance in the missiles program.

But this particular plant is very much needed. It will produce helium, and helium is about as near nothing as any commodity on earth. In fact, that's what makes helium desirable. Its value lies entirely in what it hasn't got.

Helium is odorless, tasteless, colorless, and almost weightless. It won't burn or explode. And it's so inert and unsociable that it's almost impossible to make it combine with any other element.

These qualities—or rather this lack of qualities—this virtual nothingness—make helium much sought after in industry, medicine, research, and space rockets.

Many natural-gas wells produce quite a bit of helium. But gas producers have never seen fit to build plants to recover it. Some of them say they are selling their gas for practically nothing anyway, so they can't see going to great expense to extract practically nothing. So the helium business is the one business in the whole United States on which the Government has an absolute monopoly, and everybody is content to let it.

Because helium is such a lot of nothing it has great value in the defense program. When liquefied by pressure and refrigeration, it is used in rockets and space ships to push liquid oxygen and other fuels from storage tanks to burner tips, because it's so inert that it won't contaminate them nor corrode the equipment.

In its gaseous form, helium is used in many metal-working processes to displace air during welding and fabricating operations. Some of the rarer metals now getting a big play in the defense program get contaminated when exposed to the air at high temperatures, so the only way to handle them is to surround them with an atmosphere of this inert helium.

Not only defense contractors but many other industries use large quantities of helium in welding magnesium and some other metals. A curtain of helium is blown on the weld to displace the air and prevent oxidation.

The Government got into the helium business about the time of World War I when the Navy was interested in lighter-than-air craft and discovered that helium would lift a dirigible almost as well as hydrogen, but wouldn't explode.

Since then the Bureau of Mines has invested more than $12,000,000 in four helium plants which produce more than 300,000,000 cu. ft. of the stuff annually. Now it is building another plant and wants to build many more until it increases its annual production to about 10 times the present.

This seems to be one government monopoly operated on a businesslike basis. The bureau sells helium to other government agencies at cost (about $15 per M.c.f.) and to industry at about $20 per M.c.f., and thus makes a profit.

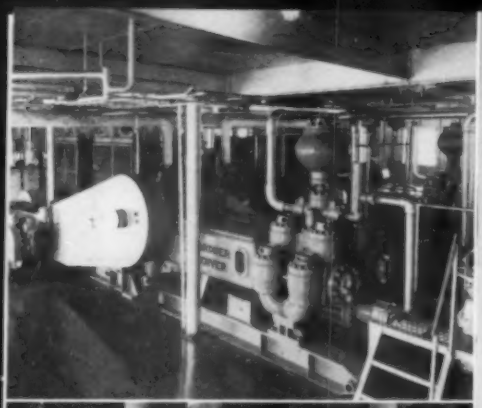
The raw material is gas going through commercial pipelines that contains 2% or more helium. After the bureau removes the unburnable helium, the rest of the gas has greater commercial value than before, so it's a good deal all around.

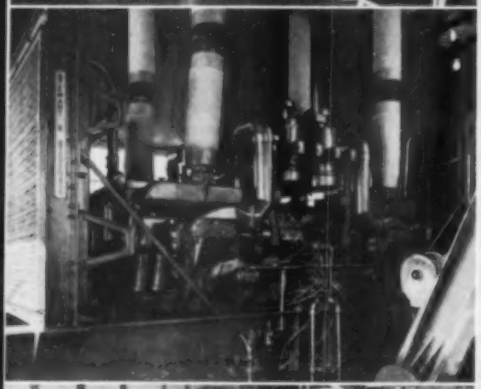
It's an odd thing, but helium was discovered in outer space long before it was known to exist on the earth. It was identified as an element in the spectrum of sunlight, and hence named helium after the Greek word for sun.

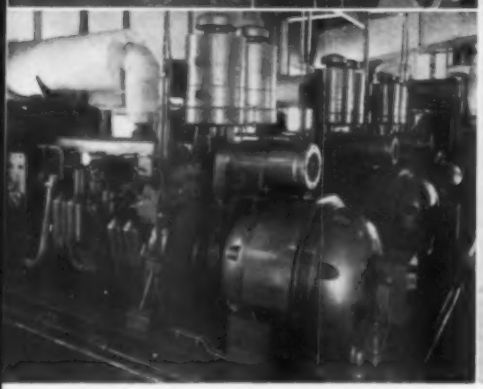
Now helium, the element first found in outer space, is essential in building vehicles to traverse outer space. Perhaps some day one of our space ships will return some helium to the sun—where it doubtless will be the only thing on the ship that won't get burned up.

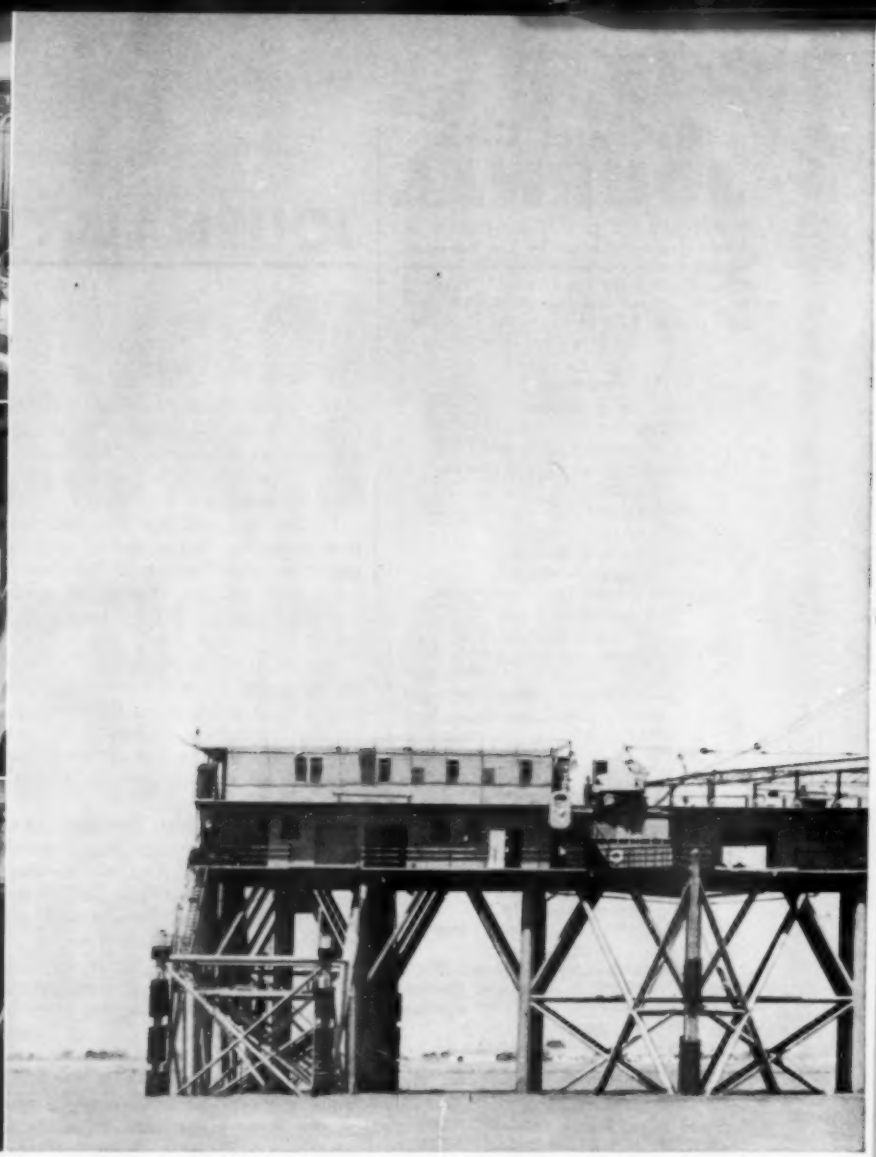
So great use is being found for this element with only negative qualities. Too bad something similar can't be done with people who fit the same description. Maybe we could put them on space rockets, too.

—Henry D. Ralph









RIMROCK TIDELANDS, INC. has selected GM Diesel Power

FOR FOUR NEW RIGS

1

Rimrock Tidelands Rig #3 Powered by two Model S-24-1000 Stewart & Stevenson RIGELECTRIC Quad Power Packages, developing 2000 combined HP. Auxiliaries consist of two S & S Model 110 GD-100, 100 KW AC Generator Sets and one Model 6-110 Power Unit.

2

Rimrock Tidelands Rig #15 Powered by two Stewart & Stevenson Model S-24-2406 Quad 110 Power Units, developing 2000 combined HP. Auxiliaries consist of two S & S Model 110 GD-110, 100 KW AC Generator Sets.

More than two years ago, Rimrock Tidelands launched a bold, new off-shore drilling program.

Dependable power was a major consideration.

To achieve versatility with maximum dependability, which is of prime importance in off-shore drilling, Rimrock's management selected Stewart & Stevenson multiple engined power packages.

Since the commissioning of Rig #3, three additional off-shore rigs have been placed in service. All four, including the mammoth new RIMTIDE which features more than 3500 horsepower, have been powered with General Motors Diesel Engines by Stewart & Stevenson Services.

If you have a power problem . . . whether it is unusual, particularly difficult or just routine . . . why not draw on the experience of the world's largest distributor of diesel engines.

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STEWART & STEVENSON

from Stewart & Stevenson IN A ROW

3

Rimrock Tidelands Rig #14 Powered by two Stewart & Stevenson S-24-2406 Quad 110 Power Units, developing 2000 combined HP. Auxiliaries consist of two S & S Model 110 GD-110, 100 KW AC Generator Sets.

4

The RIMTIDE is the newest member of the Rimrock Tidelands family of offshore drilling rigs. Powered by three Model S-24-2406 S & S model 6-110 Quads and one Model 12-2406 GM Twin 110 Diesel Engines, developing 3500 combined HP. Auxiliaries of three S & S model 110 GD-100, explosion resistant, 100 KW AC Generator Sets and one Model 6-110 GM Power Unit.

BAKER Packers put the "permanent" in permanent-type completions

When you select a Packer for a Permanent-Type Well Completion, remember this fact: of all the tools used in permanent-type well completions, only the PACKER is required to be *permanent*. Guns, Extensions, Plugs, Gas-Lift and Circulating Valves can be removed or replaced on wire line . . . but the Packer, like the casing, is required to perform for the life of the selected producing intervals. Baker Packer Completions are *permanent completions* from the standpoint of packer performance.

Baker Retainer Production Packer Product No. 415-D

Baker Retainer Production Packers have many important advantages . . . Meet dimensional requirements of Permanent-Type Well Completions; provide permanent, reliable pack-off which will hold against any pressure differential (from above or below) that is safe for the casing; Tubing String is free because neither set-down tubing weight nor tubing tension is required to achieve and maintain pack-off, although the tubing may be anchored to the packer if desired; Tubing String readily removed. Packer can be set on a wire line; is readily drillable, and can be used as either a Squeeze or Production Tool.

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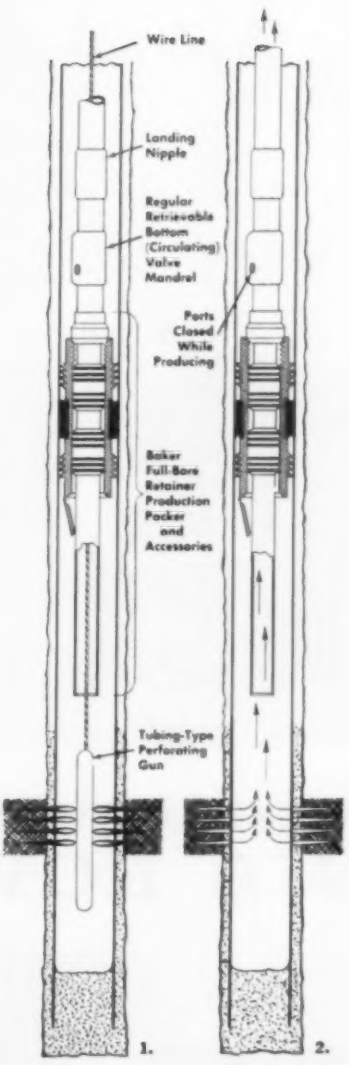


One of the many types of Permanent-Type Completions is shown above. After perforating (1) and retrieving the cable head and collar locater, the well is put on production (2). All subsequent work-overs, such as squeeze cementing to improve gas/oil ratios, are conducted with special tools which are run through the tubing string.

What to do about the election results

WHEN you read the election results next Wednesday morning, ask yourself what you did to influence the outcome.

Does the complexion of the next Congress, and of your state legislature, look favorable for the oil and gas industry?

If not, can the result be attributed to arduous, precinct-level work by organizations of a so-called liberal stripe in support of candidates and issues unfavorable to business?

THE ANSWER IS CLEAR. Businessmen, particularly oil men, must get into politics. With government increasing its influence over business conduct, business must be more active in selecting government personnel and determining government policy.

Lobbies, campaign contributions, and behind-the-scenes pressures on officials are not enough. In fact, very often they are entirely the wrong methods. Oil men in particular have frequently injured their cause by bumbling use of such methods.

The way to get results is to be in the middle of political activity, not hanging around the fringes. This means working at the precinct and district level, and it means work—stuffing envelopes, ringing doorbells, attending caucuses, holding minor party offices.

In the past only a few independent oil men, heads of their businesses, have done much of this. But oil companies should encourage junior executives and office workers to do it, and even to hold public office, without jeopardizing their positions.

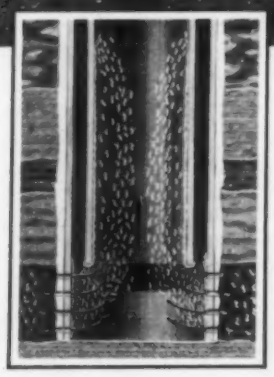
It takes money to maintain a political organization and run a campaign. Corporations may not contribute, and "big oil money" from wealthy individuals often hurts a candidate more than it helps him. But hundreds of small contributions are very effective. Employes should be encouraged to give a few dollars to a political cause that affects their future just as they are encouraged to give to the community chest.

Most important of all, oil companies should take a public stand on issues that affect their business directly or indirectly. They should tell their employes, stockholders, and the voters what specific men and measures they favor or oppose, and exactly why.

This has been done on a few matters, such as depletion and the gas bill. It should also be done on other subjects, not just oil and gas legislation but policies that will affect the general business climate.

IT WILL TAKE COURAGE at the top and drudgery in the ranks to get the business viewpoint translated into political action. But that is the way it has always been done by every effective political force, from the Anti-Saloon League to Americans for Democratic Action.

If you don't like the political trend, do something to influence the trend at its origin among the grassroots.



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See how corrosion inhibitors work to save you money. Ask your Dowell representative for a showing of this new film **"Corban Means Cash".**

NEW — "SQUEEZE" WITH CORBAN FOR CORROSION PROTECTION. A relatively new technique for protecting downhole equipment from corrosion damage has now been proved successful by Dowell. It is called the "squeeze" technique—and involves pumping Corban® corrosion inhibitor into the producing formation. The protective Corban is then gradually produced back with your normal production over a period of time. Corban plates out in a protective film on the metal equipment contacted by the well fluids.

The "squeeze" technique has given many problem wells extended protection. It has proved especially suited to high-pressure wells. Corban is a polar-type corrosion inhibitor. It is readily available in several formulas to meet specific well conditions. Call any of the 165 Dowell service points for recommendations engineered for your wells. In Canada, contact Dowell of Canada Ltd.; in Venezuela, contact United Oilwell Service. Dowell, Tulsa 1, Oklahoma.

Products for the oil industry **DOWELL**

A SERVICE DIVISION OF THE DOW CHEMICAL COMPANY

Oil Men Unhappy with Borden Report

• Canadians fear a period of confusion and delay will hamper gas exports to U. S. if royal commission recommendations are put into law. Big peril, however, is prospect of sweeping new controls for the entire industry.

CANADIAN oil men are becoming disenchanted with the long-awaited Borden Commission report which was made public in part last week.

Many are expressing displeasure both at what the report said and what it left unsaid. They fear the petroleum industry will:

. . . **Have less freedom of action** if proposed governmental regulations over oil and gas movements are accepted.

. . . **Face a period of delay** and confusion even before the controls could be put into effect if adopted by parliament.

This view is taken by the Canadian Petroleum Association after several days spent studying the report. Some earlier comments had been more favorable.

The report . . . Heart of the recommendations made by the Borden commission is the sweeping proposal for new controls over Canadian oil and gas.

The Canadian Government is asked to:

. . . **Regulate tariffs** of oil and gas pipelines through the present Board of Transport Commissioners for Canada.

. . . **License the export and import** of oil and gas or other forms of energy through a new agency called the National Energy Board.

In addition the commission:

. . . **Recognized that Western Canada's gas reserves** are sufficient to support a program of gas exports.

. . . **Attacked the original financing** and pricing policies of Westcoast Transmission Co. and the export agreement of Trans-Canada Pipe Lines, Ltd.

. . . **Delayed any recommendation** on the proposed Alberta-to-Montreal crude-oil pipeline. This is to be covered in a later report that will be out in about a month or 6 weeks.

Canadian Prime Minister Diefenbaker indicated the board's recommendations would be given early consideration and some legislative action proposed would be taken at the next session of Parliament.

A critic speaks . . . The powerful Canadian Petroleum Association went on record as being unhappy with the report.

"It holds few benefits for the petroleum industry in Western Canada," John Proctor, association general manager, said.

Now that men of the gas industry have had time to study the report, they indicate fear that delays which will be made necessary if the Borden recommendations are followed could lose a good part of the U. S. export market.

The petroleum association expressed hope that the government will give the existing Board of Transport Commissioners authority to process at least the existing applications and act on them pending establishment of the National Energy Board.

Regulations . . . Sweeping control over Canadian pipelines would be handed over to the Board of Transport Commissioners under the Borden recommendations.

The report suggests that the Pipe Lines Act be amended to make it mandatory for the transport board to:

. . . **Regulate prices** paid for gas and the rates or tolls charged for transporting gas or crude. The board also could force a company to renegotiate any existing contracts for the sale or distribution of gas within Canada.

. . . **Review the prices,** rates, tolls, or tariffs at least once every 2 years and if necessary adjust them.

. . . **Determine that all charges** are just and reasonable, are nondiscriminatory, and calculated to yield the company a fair rate of return on the shareholder's equity.

These remarks on fair return on capital invested in Canadian pipelines threw Canadian markets for a loss early in the week. Trans-Canada fell 3⅜ to 33⅛ and Interprovincial dropped 4½ to 49½ in the first day of trading on the Toronto Exchange. The next day, Trans-Canada dropped another 2⅜ and Interprovincial another 1 point.

New energy board . . . The commission's major proposal affecting the United States concerns creation of the new National Energy Board to control petroleum exports and imports.

The recommendation covering the new agency points out the government needs the "effective control over the export from and the import into Canada and the movement across provincial boundaries of all energy and sources of energy."

The board's general aim would be to study and to recommend to the government policies designed to assure Canada the best use of its energy. Specifically the board would be given authority to:

. . . **Issue certificates of public convenience** to anyone wishing to build an oil, gas or products pipeline under jurisdiction of parliament.

. . . **Issue licenses** to anyone engaged in transmission by pipeline across provincial boundaries of crude, products, or natural gas.

. . . **Issue licenses governing imports** of crude oil and petroleum products into Canada. For this purpose crude oil originating in Canada but moving through a pipeline located in part outside the country is considered imported crude.

In addition the new board would be given authority over the production, manufacture, processing, distribution, sale, and conservation of energy sources.

Heat on Westcoast . . . The Borden report was critical of Westcoast Transmission Co.'s contract to export gas to Pacific Northwest Pipeline Corp. on two counts.

The committee suggested the transport board inquire into its operation to insure that "return on the share-

Meet the Men Behind the Borden Commission

HENRY BORDEN, chairman of the royal energy commission which took his name, is a Conservative politically, a barrister by training, and a lawyer-industrialist by profession.

He is a native of Halifax, N. S., now of Toronto, and is president of the vast Brazilian Traction Light & Power Co., Ltd., and nine of its affiliate companies.

Now 56, Borden has been a lawyer since graduating from Oxford 31 years ago.

His BA degree was received from McGill University after which he went to Dalhousie University to commence law training. In 1924 he was selected a Rhodes Scholar and went to Oxford.

Most of his years at practice of law were spent in Toronto where, between 1936 and 1946, he was senior member of a prominent law firm.

From 1939 to 1942, Borden was general counsel for the federal Department of Munitions and Supply and following that moved to a post as chairman of the wartime Industrial Control Board and co-ordinator of controls with the Department of Munitions and Supply.

Borden is also chairman of the Canadian board of Norwich Union Fire Insurance Society; vice chairman of the board of governors, University of Toronto, and vice chairman of the famous Toronto Hospital for Sick Children.

Henry Borden

Other members of the commission are:

... Leon J. Ladner. This 72-year-old Vancouver lawyer is the oldest member of the commission. Senior partner in the law firm of Ladner, Downs, Ladner, Locke, and Lenox, he has been a practicing lawyer for 48 years.

He was first elected to the Canadian House of Commons as a Conservative from Vancouver in 1921, was re-elected at the general elections of 1925 and 1926, and was defeated in 1950.

Ladner is chairman of the Vancouver Advisory Board and of the Toronto General Trusts Corp. and a director of Western Canadian Steel, Ltd.; Elk Creek Waterworks Co.; Okanagan Telephone Co.; Canada Grain Export Co.; Jones Tent & Awning Co.; Alaska Pine & Celulose Co., and several others.

... Dr. Robert Dudley Howland of Halifax. He is a veteran of royal commissions, having served on the Gordon Commission of Canada's economic prospects in 1955. He is 49 and economics advisor to the Nova Scotia Government.

Dr. Howland has been Nova Scotia's economics adviser since 1950 and from 1950 to 1953 was deputy minister of trade and industry.

... Dr. Robert MacDonald Hardy, dean of the faculty of engineering at the University of Alberta. He is 52 years old and a native of Winnipeg, Man.

Dean Hardy is president of his own engineering company, R. M. Hardy & Associates, Ltd., in Edmonton and is a director of Foundation of Canada Engineering Corp.

... Jean Louis Levesque, a Quebec

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holders' investment shall not result in Canadian consumers of natural gas contributing more than their fair, reasonable, and proportionate share of the total return."

This stems from the Westcoast-Pacific Northwest deal whereby the U. S. company got gas at a cheaper rate than that paid by Canadian consumers.

The report also made pointed criticism of Westcoast's financing and indicated that it should not become a pattern acceptable to the new National Energy Board in new cases.

These comments were based on evidence that nearly 500,000 shares of Westcoast were sold to promoters at 4.9 cents a share prior to the company's contract with Pacific Northwest.

Trans-Canada puzzle . . . The idea of exporting gas into the U. S. was endorsed by the Borden report, but it left the present status of Trans-Canada's deal with Tennessee Gas Transmission Corp. up in the air.

The report said it considers void the agreement reached between Trans-Canada and the former Liberal government of Canada for exporting Canadian gas to the U. S. at Emerson.

The commission found that all of the gas covered by the permit issued to Trans-Canada has now been taken up with Canadian commitments. It is on this basis the commission recommended that Trans-Canada's assurance of a permit be rescinded.

Officials of Trans-Canada at the moment are not clear whether they will be required to file a new application for export. Trans-Canada officials believe the commission considered immediate gas requirements for Canada, projected them, and arrived at a decision that all gas now committed to Trans-Canada was needed inside the country.

Alberta originally considered 4.350 trillion feet available to Trans-Canada for both Canadian needs and export. Now the Borden Commission feels Canada needs all of this, leaving insufficient volume for export.

Trans-Canada now has further application before the Alberta Oil and Gas Conservation Board for more gas listed for both Canadian markets and export.

Gas exports . . . The Borden report was very optimistic on the subject of possible gas reserves in western Canada.

It said evidence suggests that under favorable economic conditions ultimate recovery will be 300 trillion cubic feet of natural gas in the western Canada sedimentary basin. This compares with 25 trillion cubic feet of presently proved reserves.

But the commission declared the criterion for future exports should be the assurance that Canada's present and anticipated requirements for energy will be met.

Comment . . . The reaction of Canadian oil men to the report at first was a mixture of caution and guarded optimism.

native now living in Montreal. An investment and industrial broker, Levesque is 47 and an arts graduate from Laval University.

He is the founder and president of Credit Interprovincial, Ltd., Montreal.

A member of the Montreal and Canadian stock exchanges, Levesque is also president of Show-Mart, Inc., and Show-Mart Investment Corp. He is chairman of Fashion-Craft Manufacturers, Ltd.; Max Beauvais, Ltd.; Fashion-Craft, Ltd., and Fashion-Craft Shops, Ltd.

Levesque also is vice president of Warwick Woolen Mills, Ltd. Dupuis Freres, Ltee. Librarie Beauchemin, Ltee., and Fred A. Lallemand & Cie., Ltee.

... **Dr. George Brinell,** head of the department of economics and political science at the University of Saskatchewan.

In 1937, Dr. Brinell was named advisor to the Saskatchewan government royal commission on dominion-provincial relations; from 1940 to 1941 he was chairman of a federal royal commission on coal mining in Alberta and British Columbia, and a year later headed a similar commission in Saskatchewan.

From 1942 to 1944, he was economics advisor to the wartime Prices and Trade Board in Ottawa and since 1945 has been economics advisor to the government of Saskatchewan.

In 1950 he went to Guatemala as chief of an economic mission for the International Bank for Reconstruction and Development.

E. D. Brockett, president of British American Oil Co. said:

"Our initial reaction is that the very extensive regulation of the oil and gas industry contemplated should be approached with great caution, because of its possible adverse effect on future growth and development of the industry in Canada.

R. A. Brown, Jr., president of Home Oil Co., Ltd., said he was "delighted" with the report, although it failed to deal with his recommendation for the Montreal pipeline.

Brown termed the National Energy Board "an absolute necessity." He declared the recommendation that oil imports be "licensed under government control" is in the public interest.

N. E. Tanner, president of TransCanada, and Charles Hetherington, vice president of Westcoast Transmission, both were pleased at indications the commission recognized the need for gas exports. Both officials, however, declined to comment on parts of the report dealing specifically with affairs of their companies.

watching WASHINGTON

Bertram F. Linz

• Strauss to head fuels committee

THE CABINET FUELS COMMITTEE will write the new oil import control program itself. But it may have a new chairman before it is ready for White House approval.

Commerce Sec. Sinclair Weeks, present committee head, has resigned and will leave the cabinet this week. He will be succeeded by Lewis L. Strauss, former chairman of the Atomic Energy Commission.

The departing secretary, who headed the Commerce Department for nearly 6 years, has wanted to quit for more than a year. His resignation leaves only three members of the original 1953 Eisenhower cabinet—Dulles of State, Benson of Agriculture, and Summerfield of Postoffice. And Summerfield is expected to resign soon.

Strauss got in so bad with the Senate as head of the AEC that he declined to risk confirmation for a second term in that post. His troubles with the Senate may bob up again when his new appointment comes up for confirmation next year.

Meanwhile, Carson has been told he need not make recommendations and a report based on views of the industry regarding next year's controls. The committee will start from scratch to write a new plan (see related story on p. 48).

• Industry is watching elections

A "MORE LIBERAL" APPROACH on domestic issues in Congress and bigger spending are in the cards if this week's elections give the Democrats the gains expected.

Anti-big business and spend-it-while-you-can practices won't help the oil and gas industry, either to get out from under onerous laws or avert possible new ones.

Big changes are coming in the committees dealing with oil and gas. The four top Republicans on the House commerce committee already are out of the picture, three by retirement and one by defeat. Other members may lose out this week. That could mean a big oil investigation next year to acquaint new members with oil problems.

The admission of Alaska as a state will mean three more voting members in Congress next year. There will be 98 senators and 436 representatives. The three added votes will fall in favor of the industry, however. Alaska will need the money oil men will spend on development there.

• Permits are FPC probe target

A PROBE OF THE ISSUANCE of temporary certificates and the handling of rate cases will be the first order of business when the House commerce subcommittee resumes its investigation of the Federal Power Commission.

The use of temporary permits for big-scale expansions has been a subject of criticism. Congress designed them to be issued to take care of minor additions as a quick way for the FPC to protect pipeline customers in emergencies.

However, critics charge the FPC has issued temporary certificates for projects costing over $100 million.

They claim pipelines themselves create "emergencies" and then ask for quick FPC action. They do this by assuring customers that they will have additional gas by a given date, encouraging the customers to make additional connections, it is claimed.

There are also complaints about rate making. The coal interests particularly oppose two-part rates. They argue that this enables pipelines to make low prices for gas to industrial consumers and make it up by higher charges for residential and commercial users.

Hoover's Ideas on Import Control May

• Cabinet committee relieves Carson of job of recommending changes, takes over writing the new plan, itself. New plan is expected to be a compromise, with quotas based on both historical imports and refining capacity.

THE CABINET fuels committee this week is writing its own oil import-control program.

The new version is expected to be based on a combination of refinery runs and historical imports. Thus, it will make provision for both present importers and an estimated 60 refiners who want to import.

The committee's decision to write its own ticket relieved Capt. M. V. Carson, Jr., import administrator, of his assignment to recommend changes in the plan on the basis of industry views. He continues to play an active role in discussion of details from the standpoint of their practical application, however.

The basic ideas on which the committee is working were developed by Herbert Hoover, Jr., consultant to the State Department, and F. H. Mueller, assistant secretary of commerce. These were put into draft form last week in the State Department for review by the six members of the committee.

There is no indication, so far, whether the plan will be adopted as presented or further worked over in the committee. Treasury Sec. Robert B. Anderson, who has taken a leading part in deciding import policy, and Interior Sec. Fred A. Seaton, who is responsible for its application, have been away from Washington for some time and returned only this week, without knowledge of what had developed in their absence.

The fact that both refinery runs and historical imports were under study as a basis for quotas was confirmed by Mueller in a telegram to Gordon Simpson, president of the Independent Petroleum Association of America.

Both refinery runs and weighted historical considerations "must be resolved" so that investment at home and abroad, the marketing pattern, and the "fundamental concept of opportunity" shall not be breached, Mueller said.

What's expected . . . The new plan contains some of the elements suggested by Tidewater Oil Co. and others for giving weight to the historical position of importers.

But the committee is not expected to go along with Tidewater's formula for splitting imports among the four districts east of the Rocky Mountains.

Tidewater's proposal would give 734,000 bbl. of the 826,000-bbl.-daily total allocation to East Coast importers, leaving only 92,000 bbl. for the other three districts.

It has been suggested that the committee may provide a basic allowance for historical importers, to which would be added a quota based on throughput. The allowance might run from 25 to 50%, or possibly more, of the total allocation.

It is questionable, however, that the committee will allocate imports by districts. It is argued that the PAD districts were set up in wartime for convenience in administering controls.

Imports of Crude and Unfinished Oils

CRUDE OIL—DISTRICT 5

(Thousands of barrels daily)

	Allocation September 1958	Actual September 1958	Actual August 1958
Bankline	2.3	7.0	2.3
Caminol	2.8	2.8	2.8
Century	1.5	0	(*)
Douglas	4.4	8.3	4.6
Edgington	2.8	1.5	1.5
Envoy	1.2	4.7	0
Fletcher	5.2	8.0	7.8
Golden Eagle	2.3	0	4.0
General Petroleum	24.1	23.2	21.0
Hancock	4.0	0	0
Manespo	1.4	0	0
Macmillan	2.3	2.3	2.3
Mohawk	2.9	8.6	0
Richfield	8.6	5.2	12.4
Rothschild	2.7	0	5.7
Shell	30.7	28.1	34.6
Standard of Calif.	28.0	17.9	29.4
Sunland	2.3	3.9	3.2
Texaco	19.4	19.6	20.4
Tidewater	35.8	35.8	23.0
Union	11.7	14.9	10.5
U. S. Oil & Refining	7.6	0	0
Wilshire	17.1	17.7	22.7
Total	**221.1**	**209.5**	**208.2**

*Not reported.

CRUDE OIL—DISTRICTS 1-4

(Thousands of barrels daily)

	Allocation September 1958	Actual September 1958	Actual August 1958
Atlantic	50.2	45.2	55.8
Aurora Gasoline	3.5	3.5	0
Bay Refining	2.7	3.0	2.8
Cities Service	27.8	29.5	27.3
Clark	2.0	0	5.9
Continental	5.0	5.0	5.0
Crown Central	4.3	1.3	0
Danaho	0.5	0.5	0.5
Delta	3.0	*9.0	*9.0
Dow Chemical	0.3	0	0
Eastern States	15.6	†65.9	54.0
Gabriel	6.4	6.6	6.7
Great Northern	28.1	31.0	30.6
Gulf	95.1	98.9	94.0
Hess, Inc.	9.8	16.7	15.7
Ingram	3.5	4.4	3.4
International	10.5	10.5	10.6

Replace Carson Plan

They are arbitrarily fixed areas which have little relation to actual industry operations.

As of today, it is contended, no district is entirely independent of the others. Changes in patterns in District 1 can directly affect operations in District 3, it is pointed out. And water transportation and expanded pipelines now enable refiners in District 2 to take advantage of foreign oil.

The committee also faces the question of transfers and exchanges. It may ban transfers of quotas and exchanges of crude and require importers to refine their imports in their own plants.

Other questions . . . Two other important questions also remain to be ironed out:

. . . **Whether products** other than residual fuel oil should be brought under control.

. . . **Whether the program** is to be made mandatory.

Strong arguments have been presented on both sides of these questions. But the committee also may keep in mind that Congress will return only a few days after the new program goes into effect. And domestic interests are expected to make a quick appeal for congressional action if they think the program is not airtight.

If Congress again takes up the question of oil imports next year, the fight last session will be "like a zephyr compared to a hurricane," one official commented.

Whatever type of program finally is adopted, it is expected that the transition period to full effectiveness will be much shorter than the 1 year originally contemplated.

There is considerable pressure against any transition period at all. But some officials believe that importers will need at least 3 to 6 months to adopt their operations to new quotas.

Only one point in the September draft still appears inviolate. There has been no official suggestion so far that the import total of 826,000 bbl. daily be changed.

September is high . . . Oil imports exceeded allocations under the voluntary control program for the second straight month in September.

Receipts of foreign crude averaged 989,300 bbl. daily, according to reports to Capt. Carson, administrator.

This was 55,200 bbl. per day above the recommended level of 934,100 bbl.

Crude entries averaged 11,900 bbl. per day more than in August, which was the first period in 11 months that imports exceeded allocations (OGJ, Oct. 6, p. 108).

In Districts 1-4, receipts jumped to 779,800 bbl. daily. The excess over quota was 66,800 bbl. per day.

Imports into District 5 rose slightly to 209,500 bbl. daily. This was an increase of 1,300 bbl. per day over the August total, but still below the allocation of 221,100 bbl. daily.

Imports of unfinished gasoline and other unfinished oils rose sharply in September to an average of 205,200 bbl. daily, Carson reported. This was 68,100 bbl. daily above the August figure and 25,800 bbl. per day above the May-June average to which Carson sought to hold imports.

Carson's monthly summary showed that Eastern States Petroleum & Chemical Corp. continued to ignore its 15,600-bbl. crude quota. The company imported an average of 65,900 bbl. daily according to Texas Railroad Commission reports.

A total of 18 companies reported imports in excess of quotas. But in most cases the averages were merely temporary and will be ironed out in subsequent periods.

Were Above Quotas Again in September

	Allocation September 1958	Actual September 1958	Actual August 1958
Lakehead	0.3	0.2	0.2
Murphy Corp.	4.3	5.0	6.8
Northwestern	11.5	8.4	10.0
Ohio Oil	3.5	3.5	5.5
Phillips	10.2	10.0	12.4
Pure	5.0	5.0	4.8
Republic	4.0	3.9	8.0
Shell	6.4	2.4	2.1
Sinclair	53.0	53.3	52.9
Socony Mobil	57.2	57.2	57.9
Southwestern	2.5	3.8	4.1
Standard of Calif.	56.9	66.0	53.0
Standard of Indiana	25.4	24.3	26.4
Standard of N. J.	61.4	61.6	63.1
Standard of Ohio	7.0	11.4	0
Sun	43.0	39.8	55.8
Sunray Mid-Continent	5.0	5.0	0
Tennessee Gas	3.5	0	4.2
Texas Asphalt	2.0	2.0	2.0
Texas City Refining	4.0	4.3	0
Texaco	46.4	45.7	48.0
Tidewater	29.2	36.0	27.4
United	3.0	0	3.3
Total	**713.0**	**779.8**	**769.2**

*Estimated. †From Texas Railroad Commission.

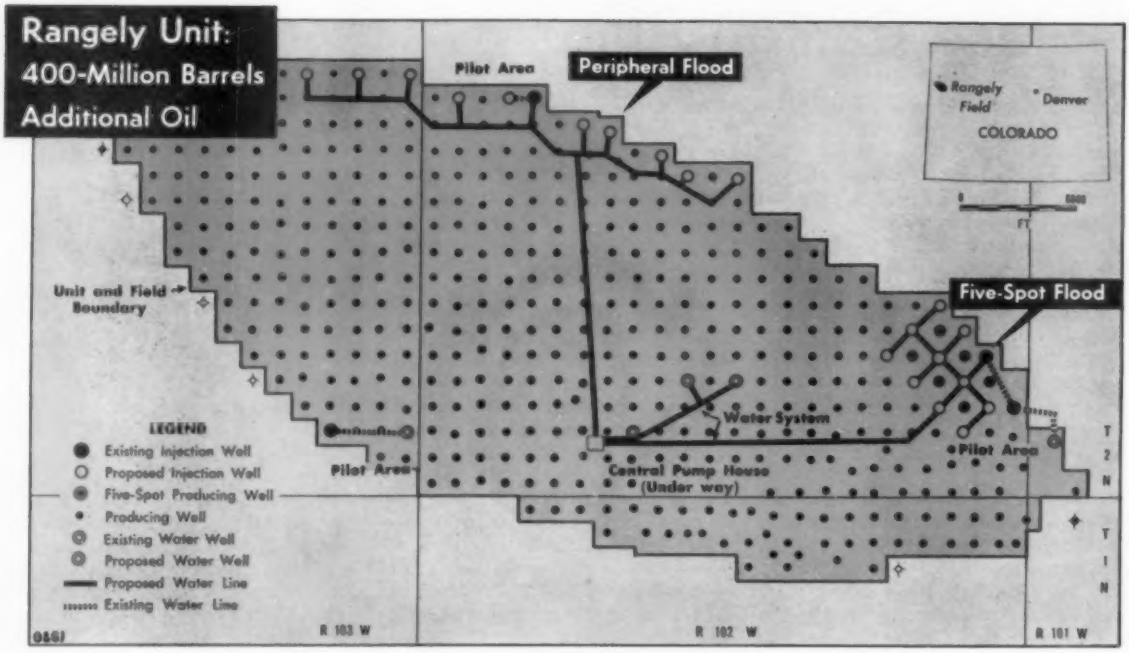
UNFINISHED GASOLINE, OTHER UNFINISHED OILS

DISTRICTS 1-4

(Thousands of barrels daily)

	Average May-June 1958	Actual September 1958	Actual August 1958
Atlantic	5.7	3.9	0
Cities Service	0	3.5	*3.2
Crown Central	5.6	5.4	0
Eastern States	12.3	†0	17.9
Gulf	16.3	15.5	16.1
Hess, Inc.	25.3	31.5	0
Sinclair	7.3	9.9	6.5
Socony Mobil	19.7	26.4	6.6
Southwestern	4.1	0	4.4
Standard of Calif.	8.5	16.1	17.9
Standard of Indiana	24.8	35.4	33.6
Standard of Ohio	1.7	0	5.9
Texas City	7.0	3.8	3.7
Texaco	13.8	15.4	4.5
Tidewater	20.0	28.7	12.5
Union	4.7	5.4	0
U. S. Oil & Refining	2.6	4.3	4.3
Total	**179.4**	**205.2**	**137.1**

*No quota required for asphaltic residium imported prior to September 16. †From Texas Railroad Commission.



Rangely Field Ready for Big Flood

● Calco to start water injection in April to supplement present gas drive. Two-phase program may jump ultimate recovery to 750,000,000 bbl.

RANGELY will be in the same class as Oklahoma City field and West Texas' Kelly-Snyder field once the secondary-recovery program planned for the field gets into full swing.

Reserves underlying Rangely have been estimated at about 1,500,000,000 bbl. The flood, together with the gas-injection program already in operation, is expected to bring up 50% of the oil in place.

This is more than twice the estimated 350,000,000 bbl. recoverable through primary means. From 1932 to 1958, Rangely had produced nearly 244,000,000 bbl. of primary oil.

Looking at it another way, new oil expected from Rangely is equal to all the oil produced in the three states of Montana, Nebraska, and North Dakota up to 1958.

The 19,120-acre Rangely unit, one of the nation's largest, was approved last year after 10 years of work by the Colorado Oil and Gas Conservation Commission and operators to curb gas flaring (OGJ, Aug. 26, 1957, p. 70).

Gas injection was carried out even before unitization. But unitized operation has made possible a more efficient program. Flaring has been reduced from about 50,000 M.c.f. daily to the present 5,600 M.c.f. daily.

Flood plans . . . First phase of the field-wide flood will involve only the north and east flanks of the field.

Construction has begun on a $500,000 pump station, which will have initial capacity of 40,000 bbl. daily. But it's designed for possible expansion to 200,000 bbl. daily, by adding more pumps and engines.

The program is based on results of three pilot floods on the north, east, and southwest edges of the field. But only two pilot areas are involved in the first phase of the expanded flood.

The California Co., unit operator, said the north flood will be peripheral, and the five-spot pattern will be used for the east flank where sand is tighter. Each of these areas will have 10 injection wells initially. Both areas will be connected by 12-in. lines from the central pump station.

Engineering for the plant will be completed by Proctor Engineering Co., Tulsa, in about a week. But Calco has already started foundation work to get a head-start on the cold weather. Major contract for construction will probably be awarded later this month.

Plans call for two 20,000-bbl. 1,200-psig. discharge quintuplex pumps directly connected to two 500-hp. natural-gas engines and one 40,000-bbl., 100-psig. centrifugal booster pump with gas-driven engine. Water-treating and filtering facilities could be added if and when needed. Water will come from the Entrada and Navajo formations.

Pilot floods . . . Calco began the pilot projects shortly after unitization. About 627,000 bbl. of water have been injected.

Injected wells were deepened to expose as much of the Weber sand as is exposed in producers upstructure. The Weber is found at an average of about 6,400 ft.

Completion involved running tubing and packer and setting packer near 7-in. casing shoe. Water injection is down tubing. Injection rates and profiles were measured by spinner and temperature surveys and one radioactive survey. Calco feels that the temperature surveys are the best for future studies.

Gas program . . . About 40 wells with GOR in excess of 6,000:1 have been shut in since unitization. However, average GOR has increased from 2,510 to 2,626 the past year.

Gas handling has been increased from 96,500 M.c.f. daily to 106,000 M.c.f. by modifying handling equip-

ment and better use of compressors.

While injection has been increased, number of gas-injection wells was reduced from 19 to 17. The program is moving from dispersed to crestal-type injection. In the near future the program will involve eight crestal wells and six dispersed wells.

The unit . . . There are currently 389 wells producing from the Weber in the unit. Of these 374 are pumping.

Production now averages about 53,000 bbl. daily. Before unitization, production was about 70,000 bbl. daily.

The unit has 45 operating interests. Calco, which discovered the field in 1932, has 45% interest in the field. Other chief interest owners include Union Pacific Railroad, Pan American Petroleum Corp., Phillips Petroleum Co., Equity Oil Co., and Utah Southern Oil Co.

At the time of unitization, Warwick M. Downing, commission chairman, said that oil in place in Rangely at time of discovery was estimated at from 1½-billion to 2-billion barrels.

Operators believe the secondary-recovery program will lengthen the field's life to 30 or 40 more years.

Jake L. Hamon
. . . to receive first Young Award.

W. S. S. Rodgers
. . . cited for distinguished service.

API Honors Hamon, Rodgers

TWO LEADERS of the oil industry will be singled out for awards at the annual API meeting in Chicago next week.

Jake L. Hamon, Dallas independent, has been named first recipient of the Carl A. Young Memorial Award. W. S. S. Rodgers, former president and retired chairman of The Texas Co., will receive the Gold Medal for Distinguished Achievement.

The Young Award will be presented to Hamon by D. L. Connelly, vice president of production for Warren Petroleum Corp., Houston, and API vice president for production.

Hamon is being cited for "exceptionally meritorious service to the petroleum industry over the last 22 years." This service includes API chairman in 1956-57 and API vice president for production in 1947-48. He is currently pushing industry efforts to attain wider well spacing (see page 58).

The award commemorates the late Carl A. Young who headed staff activities of the API division of production for 29 years.

Gold Medal . . . The Gold Medal Award, which will go to Rodgers, is one of the nation's top industrial awards and the oil industry's highest honor.

It will be presented November 10 by H. S. M. Burns, president of Shell Oil Co. and API chairman.

Rodgers started in the oil industry in 1911 as a roustabout and tool dresser and joined Texaco 4 years later. In 1928 he was elected vice president in charge of domestic sales. He became president 5 years later.

He was named chairman in 1944, retiring in 1953. He is still a director and member of the executive committee. He is also director of Freeport Sulphur Co., Jeffrey Manufacturing Co., Armstrong Cork Co., Empire Trust Co., and Great American Insurance Co.

Labor Maps Plans

for congressional barrage. New proposals will include depletion, imports, taxes.

ORGANIZED LABOR has a mammoth legislative package to lay before Congress next year.

Already "at least" 17 measures have been lined up by the AFL-CIO legislative department, with more to come. Many of them deal with federal aid in various fields. Others would affect the oil and other industries, some of them substantially.

National union leaders started the ball rolling by calling on labor to support candidates "friendly" to its cause in voting this week. Voting should be on the record and the promises of individual candidates, rather than those of either political party.

The coming Congress will run until the next presidential campaign opens. What it does with labor's program will have a direct effect on the labor vote in 1960.

Topping the long list of organized labor's measures is "complete overhaul" of the Taft-Hartley Act "to restore justice and equity to both labor and management."

This has been the big objective right from the day it became law. Labor leaders believe that the bigger liberal bloc expected in Congress next year offers a chance to accomplish something.

A number of other bills affecting industry and business will be offered by friends of labor in Congress next session:

. . . Antiracketeering legislation to protect "clean" unions from improper activities in both labor and management.

. . . Increase minimum wage to at least $1.25 an hour and extension of the Fair Labor Standards Act to fields not now covered.

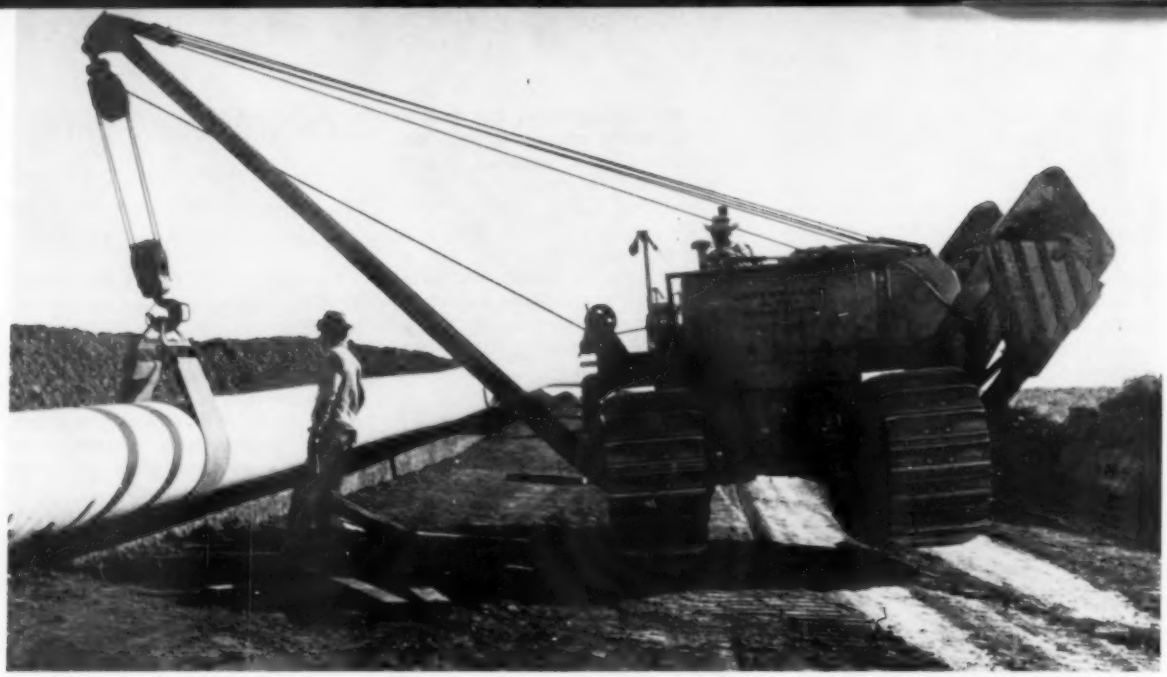
. . . "Strengthening" the Walsh-Healey and Bacon-Davis acts dealing with wages to be paid by government contractors.

. . . Tax revision to cut the income levy for low and middle-income groups, close "loopholes" (including depletion), reduce excise taxes, and exempt contributions to the social-security retirement system from tax.

. . . Modernize the unemployment compensation system.

. . . Trade adjustment programs for industries and workers adversely affected by imports.

What the 86th Congress does with these and other parts of the program will guide labor leaders in their political efforts in 1960.



SIDEBOOM TILTS under 26-ton load which it shares with three other big lowering-in tractors ahead. The 36-in. o.d. by 0.344-in. wall pipe weighs 5,236 lb. per 40-ft. joint.

Biggest 36-In. Looping Project Laid

• Each of five spreads moves ahead 1 to 2 miles per day building 514 miles of line for Natural Gas Pipeline between the Texas Panhandle and Joliet, Ill. Capacity will be increased 100,000,000 cu. ft. per day.

SEVERAL thousand more Chicago homes will be cooking and heating with gas this winter.

Distribution companies in Chicago and other market areas in Iowa and Illinois will be able to expand service because of a rush project by Natural Gas Pipeline Co. of America. The $82-million expansion program was filed in April. It cleared the FPC in July and kicked off in August.

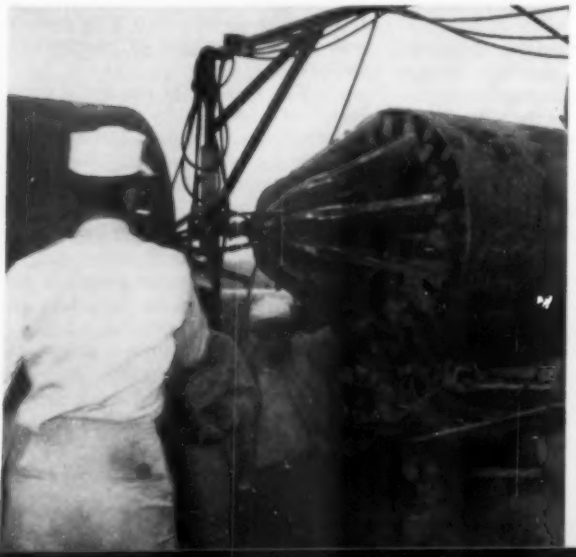
The job was divided into five sections of about 100 miles each. R. H. Fulton & Co. was awarded two, Williams Brothers two, and Contracting & Material Co., one. They were given a December deadline for laying 493 miles of 36-in. and 21 miles of 26-in.

This was a large order. They would have to lay the greatest mileage of 36-in. ever constructed in a single project. And they would have to lay this superinch pipe, the largest in high-pressure transmission service, faster than ever before.

Secret of speed . . . That is what the contractors have been doing—laying 36-in. at a record pace.

The secret of their speed is simply a combination of plenty of manpower, plenty of extra-heavy equipment, and the know-how of organizations expe-

PNEUMATIC CLAMP rounds out pipe ends, speeds lineup on pipe gang for all spreads.



CAREFUL BENDING, with bends limited to 12°, avoids wrinkling of pipe.

LONGEST FIRING LINE seen on a construction project is this Williams Brothers crew of 23 welders strung out to the top of the hill and beyond.

at Fast Pace

rienced in big-inch pipelining. Several methods to gain maximum laying speed were observed by Gene T. Kinney, the Journal's assistant pipeline editor, who spent a day on each of four spreads.

The key to progress on this job, like most others, was line up. This operation was slowed by choppy terrain, where many bends had to be handled, and by the time required to round out the large-diameter, thin-wall pipe which becomes "egged" slightly in storage and transit.

All five spreads were equipped with a powerful pneumatic internal lineup clamp which did the job quicker than a mechanical hand-cranked clamp.

Williams Brothers used a second pipe gang to avoid the bottleneck at road crossings. It made the transitional weld from line pipe to the heavier wall road-crossing pipe so the main pipe gang didn't have to slow down. This spread had 47 welders, 6 to 13 more than the other four.

Spread progress . . . The big Williams Brothers spread was making about 10,000 ft. per day compared with 6,000 to 8,000 ft. for the others.

On the days the project was toured, Fulton's welders were "blown out" by typical western Kansas weather—a wind and dust storm, followed by rain and hail. The big Williams Brothers spread added more than 11,000 ft., because of the large number of welders. Its smaller spread made 5,700 ft. on a day when it had several small joints to fit in, and Contracting & Material made 6,000 ft.

The pipeline company restricted bends to 12° or less. This required extra grading in choppy terrain. One spread used 11 bulldozers, including one machine equipped with a rooter, to speed earth moving.

Fulton used two ditchers, a conventional machine for the pilot ditch followed by a larger one with custom-made wheel and buckets fabricated by the contractor. The others had three ditchers leapfrogging, making a full-size ditch in one pass.

DOPE MACHINE applies asphalt on suction side of station, coal tar on hot discharge line.

EXTRA DEEP DITCH, 82-in. by 48-in., leaves pipe below plow depth in farmland.

Oil Prospects Brighter Through '59

(Thousands of barrels daily, except closing stocks)

	1958			1959				
	*3rd Q	4th Q	Year	1st Q	2nd Q	3rd Q	4th Q	Year
Domestic Demand								
Gasoline	4,145	3,830	3,870	3,595	4,190	4,230	3,950	3,991
Kerosine	182	410	314	490	175	200	430	324
Distillate	1,172	2,110	1,768	2,635	1,350	1,240	2,220	1,861
Residual	1,247	1,540	1,434	1,735	1,325	1,255	1,585	1,475
Other	1,738	1,625	1,603	1,615	1,710	1,910	1,760	1,749
Total	8,484	9,515	8,992	10,070	8,750	8,835	9,945	9,400
Exports								
Gasoline	74	70	71	65	70	70	60	66
Kerosine	4	5	3	5	5	5	5	5
Distillate	56	60	55	55	50	50	55	53
Residual	75	60	66	60	60	60	60	60
Other	73	70	74	75	70	75	70	73
Total	282	265	269	260	255	260	250	257
Total Demand	8,766	9,780	9,261	10,330	9,005	9,095	10,195	9,657
Total Stock Change	426	—217	—130	—623	517	510	—336	20
Total New Supply Required	9,192	9,563	9,131	9,707	9,522	9,605	9,859	9,677
Closing Stocks (million bbl.)								
Gasoline	173	187	187	209	184	174	188	188
Kerosine	31	26	26	17	25	32	27	27
Distillate	156	132	132	71	106	158	134	134
Residual	69	64	64	56	62	67	62	62
Other products and natural-gas liquids	135	135	135	135	148	141	135	135
Crude	250	250	250	250	260	260	255	255
Total	814	794	794	738	785	832	801	801

*Estimate based on U. S. Bureau of Mines and API data.

Domestic Demand to Stage 4.5% Rise

• IPAA forecasts 9,677,000 bbl. daily of new petroleum supply needed next year based on continued business upturn. Estimates on domestic crude production and refinery runs withheld due to uncertainty on imports.

IMPROVED business activity expected throughout 1959 means the U. S. petroleum industry will be called on to supply:

. . . **9,400,000 bbl. daily** for domestic demand.

. . . **257,000 bbl. daily** for export.

. . . **20,000 bbl. daily** for inventory buildup.

. . . **9,677,000 bbl. daily** total new supply needed.

This is the picture painted for the oil industry by the Supply and Demand Committee of the Independent Petroleum Association of America. Its report was given the group's Dallas convention last week.

Part of the good 4.5% gain which the above volume for domestic demand represents can be credited to the low base for 1958 which in turn resulted from restricted gains made in 1957 and 1958.

For example, 1958 domestic demand probably will be 8,992,000 bbl. daily, up only 2% over 1957 which in turn was only 0.4% above 1956. The 3-year period thus shows only a 7.07% gain for domestic demand. Record gain in domestic demand since the war was 12.1% in 1950.

The business upturn . . . One of the major factors responsible for the expected better showing for petroleum next year is the rise in general economic activity.

The IPAA committee measured business conditions in terms of Gross National Product and the Federal Reserve Board Index of Industrial Production.

Low point of the current GNP curve came in the first quarter of this year with an annual rate of $426 billion. There was a small gain to $429 billion in the second quarter and a much larger increase in the third. Industrial production didn't hit bottom until the second quarter, but the index showed a gain of 5.4% between the second and third quarters of this year.

The committee's forecasts of GNP for 1959 falls in the range of 5 to 7% gain over 1958. Industrial production for 1959 is expected to be up 8 to 12% over this year.

Uniform good picture . . . Gains in domestic demand are predicted in 1959 for all products.

In fact, demand will gain in each

How Products Share in Domestic-Demand Gains

(Percentage increase over same quarter of previous year)

	Gasoline	Kerosine	Distillate	Residual	Other
1958					
First quarter	—2.34	11.36	3.85	—5.81	2.90
Second quarter	2.04	—1.22	4.35	—13.44	9.76
Third quarter	2.35	2.82	4.55	—0.64	6.11
Fourth quarter	3.71	4.33	5.82	0.52	7.54
Year	**1.47**	**6.44**	**4.55**	**—4.72**	**6.23**
1959 Forecast					
First quarter	3.81	—2.00	3.99	2.00	8.39
Second quarter	3.30	8.02	6.22	8.25	8.57
Third quarter	2.05	9.89	5.80	0.64	9.90
Fourth quarter	3.13	4.88	5.21	2.92	8.31
Year	**3.05**	**3.18**	**5.26**	**2.86**	**9.11**

quarter for every product except one. Kerosine will show a 2% drop in the first quarter but thereafter show good to moderate gains (small table). Kerosine for the year will mark up a 3.18% gain which by volume means a 10,000,000 bbl. daily increase.

The largest percentage gain for gasoline is expected in the first quarter of next year. Part of this gain again is due to the low base demand in the first quarter of 1958 when gasoline demand was off 2.3%. The gain for the first quarter of 1959 is put at 3.8% compared with 3.05% for the full year. This means an increase of 118,000,000 bbl. daily.

Distillates will show a 5.26% increase for the year or 93,000,000 bbl. daily more and residual will enjoy a 2.86% gain amounting to 41,000,000 bbl. daily.

Best gains will occur among the minor products which when lumped together will increase by 9.11%. Of the 408,000,000 bbl. daily total increase for all products, the smaller products will account for 146,000,000 bbl. daily.

The committee, meanwhile, predicted that the export market for U. S. crude and products will dwindle slightly. Average exports for 1959 will total 257,000 bbl. daily, down 4.5% from the estimated average for 1958.

The required new supply of crude and products—9,677,000 bbl. daily—will show greater gains than total demand.

The explanation for this lies in the inventory situation. Part of the 1958 demand was supplied from inventories while part of the 1959 supply will go into storage.

The committee estimated that the stock drop for 1958 will be 130,000 bbl. daily but that stocks will increase 20,000 bbl. daily in 1959. This is a net difference of 150,000 bbl. daily.

The increase in total demand will be 396,000 bbl. daily but required new supply will show a gain of 546,000 bbl. daily.

Production uncertain . . . The only supply item forecast by the committee is production of natural-gas liquids.

The average for 1959 was set at 825,000 bbl. daily for a gain of 25,000 bbl. daily over 1958.

On production, imports and refinery runs, the committee merely said: "The U. S. Government has not reached a decision pertaining to its import program for 1959. As a result, the committee has no reliable basis for forecasting imports of either crude oil or refined products and therefore is not presenting at the present time a forecast of domestic crude oil production for the coming year.

"Furthermore, the recent rapid increases in imports of finished and unfinished products and the lack of information as to the future course of this element of new supply also precludes a forecast of crude oil runs to stills."

INDUSTRY BRIEFS . . .

A new wildcat in Washington is planned by Standard Oil Co. of California. The company has abandoned a 7,419-ft. hole 15 miles northwest of Everett in Snohomish County and is preparing a new site 25 miles northwest of Everett in the Whidbey Island region of Island County. The new attempt will go to 5,000 ft.

Louisiana's oil allowable for November will remain at its October level except for an additional 4,686 bbl. covering new production. The November allowable is 846,631 bbl. per day.

A special oil-industry stamp will be issued by the post-office department to commemorate the industry's centennial in 1959. First-day sale of the stamp will be August 27 at Titusville, Pa., where the famous Drake well came in 100 years ago. The stamp will go on sale at other post offices the following day.

The world's largest oil barge was launched last week at the Bethlehem Steel Co. shipyard at Beaumont, Tex. The barge is 305 ft. long and has a capacity of 62,000 bbl. It was built to supply the new Perth Amboy, N. J., refinery of Hess, Inc., with crude and products from various East Coast terminals.

Headquarters of Tidewater Oil Co. will be moved about December 1 to a new office building under construction in Los Angeles. Tidewater's main offices now are located in San Francisco.

H. S. M. Burns, president of Shell Oil Co., will serve as president of the Fifth World Petroleum Congress when it meets in New York next year. Burns, who also is chairman of the board of API, accepted the presidency last week from the congress secretariat. He will preside at the more important functions planned for the 5,000 to 6,000 visitors expected in New York May 30 through June 5.

Kansas allowables have been reduced slightly to 327,000 bbl. daily in November. This is 3,000 bbl. below last month's allowable, in line with recommendations made by the conservation director. The daily minimum per well is 28 bbl.

A permanent exploration office has been set up in Anchorage, Alaska, by Sunray Mid-Continent. The company has just completed an aeromagnetic survey of the Kenai Peninsula area where it has 135,000 acres under lease. Drilling is expected to begin early next year.

Pipeline Decision Due

. . . in Texas. Commission studies first plea under new order to force common-carrier lines to connect wells.

THE FIRST INDICATION of how the Texas Railroad Commission will apply its broad pipeline-connection order of last June will probably come within the next few weeks.

The question is one of the most important in the history of the commission: Whether, for the first time, to order a common carrier to connect a producer's oil well against the wishes of the pipeline.

The commission is tussling with the problem after listening to a formal plea by C. T. Robertson, Wichita Falls independent, and others. They have asked the commission to order Phillips Pipe Line Co. and/or Phillips Petroleum Co. to connect and buy oil from three dually completed oil wells in the Embar fields area of Andrews County, West Texas.

This is the first petition under the commission's historic order of June 4 in which the commission laid down general rules for making connections to a well on request of the producer (OGJ, June 16, p. 59).

The June order capped an 18-month effort by Texas independents to get more oil wells connected to pipelines.

The situation . . . The three Robertson wells have a total monthly allowable of 5,522 bbl. (based on 11 producing days) from the Embar-Permian and the 5,600-ft. pay zones.

The first well on the 160-acre lease was completed in late February, and a fourth well is now drilling.

The acreage was obtained by the Robertson interests from Phillips via a farmout. Offset wells to the north and east are operated by Phillips Petroleum and connected by Phillips Pipe Line. The connection is 4,500 ft. west of the Robertson tank batteries.

Robertson's argument . . . Robertson contends that Phillips would have to lay less than a mile of gathering line and install a pump to take this oil but that the company has refused to do so, claiming that it's uneconomical.

Phillips has told him, he said, that it would cost the company about $6,500 to connect the lease—about $5,500 for the line and $1,000 for the pump.

He said Phillips has laid an 8,000-ft. line to take casinghead gas from the wells to its gasoline plant, despite the fact that the oil under the leases is of far more value than the gas.

Robertson said that currently he is forced to pay a charge of about 15 cents a barrel to a trucking firm to transport the oil to Phillips, the only gatherer in the field.

This, in effect, reduces the price he gets for his oil by 15 cents a barrel, he said, and amounts to discrimination in that Phillips Petroleum pays no such penalty through producing oil of the same quality.

Phillips' side . . . Phillips unlimbered a big gun to argue its case.

W. H. Wallace, vice president of operations for Phillips Petroleum, testified that connecting the Robertson batteries was not economically feasible.

Phillips Pipe Line studies show, he said, that facilities wouldn't pay out in reasonable time; even with depreciation Phillips would still lack $1,600 of redeeming its investment in pipeline and pump after 11 years.

Phillips suggested that the producer lay the line and accept 1 cent a barrel for delivering the oil, but this offer was refused by Robertson on grounds that he "didn't want to get into the pipeline business."

Robertson is now paying between $750 and $800 a month for trucking and will pay roughly $1,000 a month when his fourth well is completed, Wallace said. Phillips figures that Robertson could pay off the connection in 1.22 years with what he would save by not having to truck.

On top of this, he would get 1 cent a barrel tariff for delivering the oil, Wallace said. If Robertson would lay the line, Phillips would stand the cost of gaging and testing the oil.

Do rules apply? . . . The Robertson case would appear to fit under a portion of the so-called ground rules laid down by the commission last June.

One section held that common-carrier lines must connect lease batteries with a field on request of the producer when the carrier has the only pipeline serving that field.

However, the order also states that the commission will consider evidence relating to the ability of the line to carry the type of oil involved, the market or lack of market, the period required to return the capital investment for the connection, and other factors.

Phillips asks an exception from the order on grounds that payout of its connecting investment in the Embar field case would stretch out too long—if, in fact, it could ever be recovered.

Case may go to court . . . Phillips stipulated at the opening of the hearing that, although participating in the hearing, the company was not waiving its rights to go to the courts.

Thus, there is a real possibility that the company, if it should lose the bout before the commission, would attack the June 4 order in the courts as invalid either in entirety or as its application in the Embar case.

PIPELINE BRIEFS . . .

Carbon field gas reserves in Alberta will become available to Calgary this month on completion of a 58-mile, 16-in. line. Canadian Western Natural Gas built the transmission line and a 17-mile, 3-in. gathering line. The $9,500,000 project will supply up to 40,000 M.c.f. daily and ultimately 150,000 M.c.f. daily to Calgary.

Gas from Trans-Canada Pipe Lines will be flowing this month through the 90-mile, 10-in. lateral of Northern Ontario Natural Gas Co., Ltd., from North Bay to Sudbury. Mannix Co. will complete the project this week. A 32-mile lateral to Timmins also is finished. Northern Ontario has a large industrial load, including 6,000,000 cu. ft. daily to an International Nickel plant and sizable volumes to 11 pulp and paper mills.

An $8,000,000 project planned by Mississippi River Transmission Corp., a new affiliate of Mississippi River Fuel Corp., will boost the St. Louis area gas supply 115,000 M.c.f. daily. A 115-mile, 24-in. line is planned from the Texas Eastern compressor station near Oran, Mo., to St. Louis. The gas will be sold to Laclede Gas Co., St. Louis distributor, and Illinois Power Co. Completion is due in the fall of 1960.

World's Longest Pipeline Completed

THE VAST gas reserves of Alberta have at last been linked with the great population centers of eastern Canada.

A hip-booted welder, standing in a muddy ditch near Kapuskasing, Ont., made the weld which joined the pipe into a continuous line stretching 2,294 miles from Burstall, Sask., on the Alberta border, to Montreal. This marked the completion of Trans-Canada Pipe Lines, Ltd., a $375-million project which is one of the most important events in Canada's oil history.

Testing has been completed and Alberta gas will soon reach burner tips in Montreal. Trans-Canada will provide a market for some 200,000 M.c.f. daily immediately. The company estimates requirements over the next 30 years will be 23 trillion cubic feet.

Construction began in July 1956 when parliament agreed to help finance the 34-in. Burstall-Winnipeg leg. But a steel strike prevented completion of this section until last year when the line also was extended to Port Arthur, Ont., and gas service reached the Great Lakes.

The 20-in. Toronto-Montreal section also was completed last year and operated with gas borrowed from an Ontario distributor. The 852-mile, 30-in. gap was bridged this year, completing the all-Canadian line for which planning began 7 years ago.

Texas Firm Expands

producing operations with acquisition of Oceanic Oil.

PRODUCING PROPERTIES, Inc., Dallas, last week entered into a contract to absorb Oceanic Oil Co., Los Angeles.

The Dallas company will exchange 750,000 shares of new common stock for Oceanic properties including:

. . . 231 producing wells in California, West Texas, and Wyoming. Production, including two waterfloods, is mostly in California.

. . . 50,000 acres of leases, undeveloped, over the United States.

. . . 200,000 wildcat acres in Alaska.

. . . 6,600,000 bbl. of net primary oil reserves. The reserves estimate, according to Robert J. Bradley, president of Producing Properties, was made by independent engineers.

Producing Properties is paying a "paper" price for these properties of about $6,375,000, based on present over-the-counter market quotations for its stock. The exchange ratio is roughly 2½ shares of Oceanic for each share of Producing Properties.

The Oceanic deal is the thirty-ninth purchase of producing properties by the Dallas company since it was formed 3½ years ago. Value of the properties acquired in these purchases now totals about $50,000,000.

Producing Properties made its first move into California last June when it bought 99 Wilmington field wells from Continental Production Co.

On completion of the Oceanic deal, Oceanic will be liquidated and its operating and management personnel absorbed into Producing Properties.

A 173-mile 30 and 34-in. looping program is planned by Pacific Gas & Electric during 1959-60. PG&E will lay 49 miles of 34-in. next year and 82 miles in 1960 on the Topock-Milpitas line, plus 11 miles of 30-in. next year and 31 miles in 1960 between Pittsburgh and Irvington, Calif. Compressor-station expansion includes 7,000 hp. at Topock, 12,500 hp. at Hinkley, and 8,000 hp. at Kettleman.

Contract to extend Shell Pipe Line's facilities from Colorado City, Tex., to the Borden-Garza county area of West Texas has been awarded to Conner Construction Co., Odessa. Conner plans to complete 5 miles of 4-in., 13 miles of 6-in., and 44 miles of 8-in. in December. The new line will deliver crude to the affiliated Basin Pipe Line system at Colorado City.

A 48-mile products line between Bremen and LaGrange, Ga., was completed recently by Plantation Pipe Line Co. Nichols Construction Co., Baton Rouge, La., laid the 4-in. line, which parallels an existing line serving the Columbus and Macon areas.

Also for Pipeliners . . .

IN THE NEWS: Borden report proposes sweeping controls over Canadian oil industry, especially pipelining (p. 45) . . . Natural Gas Pipeline Corp. is setting a fast pace on its 36-in. line to Chicago (p. 52) . . . Railroad Commission must decide soon on first plea to force pipeline connection (p. 56) . . . Final weld made on Trans-Canada gas line (p. 57).

A complete list of pipeline construction projects appears in the last issue of each month. New projects are reported weekly in pipeline briefs.

PLUS THESE TECHNICAL REPORTS: Design of valve operators (p. 111) . . . Transducers protect large centrifugal pipeline pumps (p. 71).

Wider Spacing Urged

. . . by Jake Hamon as means of cutting production costs. Meeting of grass-roots steering group to be held Tuesday.

THERE'S ONLY one really significant way to cut costs today. That, says Jake Hamon, "is not to drill two wells where one would do the job."

The former API chairman told the annual meeting of the Independent Petroleum Association of America in Dallas last week that oil men are facing a ceiling on crude-oil prices while looking at higher and higher costs.

What's needed, Hamon said, is an industry-wide effort to achieve wider spacing and more emphasis on acreage in granting production allowables.

Wider spacing, he said, will permit a higher per-well production and lower production costs per barrel of oil. It will mean fewer development wells and a resulting economy which will permit the drilling of badly needed wildcats.

"If we went to wider spacing, we would save a lot of money that is now wasted, and at the same time would produce the same amount of oil," Hamon said. "Whether we like it or not, we are in competition with foreign oil and it behooves us to become more efficient. After all, under our present practices we cannot even compete with Canadian oil due to their wider spacing."

Pooling urged . . . Hamon also suggested that authority be given state commissions to order unitization in fields where a majority of the operators feel it is needed and where the plan is fair.

There is much opposition to this idea, he said, and such a program will not be tackled by the newly formed Oil Industry Conservation Forum (OGJ, Oct. 13, p. 70). Hamon is chairman of the forum's steering committee.

Hamon told the IPAA the new grass-roots conservation committee will stick for the moment to efforts to get industry acceptance and action on wider spacing.

Meeting this week . . . The 20-member steering committee of the conservation forum will hold its first formal meeting Tuesday in Houston.

Purpose of the initial meeting will be to determine the area of the forum's study rather than to make recommendations.

But forum members already are hard at work and apparently making gains in pushing for wider spacing patterns in Oklahoma and Mississippi.

The forum has been a grass-roots movement. It has stemmed from a growing realization by domestic operators, both majors and independents, that domestic oil must compete with cheaper foreign oil—and the only realistic way for it to do so is for operators to cut the per barrel cost of producing in the U. S. Essentially, this means employing fewer wells to produce the same amount of oil.

Forum chairman is E. B. Miller, vice president of Tidewater Oil Co., Houston.

Miller, in calling the Tuesday committee meeting, said that the public and industry reaction to the committee's recently announced objectives has been favorable. This, he said, has enhanced the forum's high hopes that it can accomplish its objective to help remedy the industry's current economic ill health.

Membership . . . Miller revealed names of the members of the steering committee which will plot the forum's courses of action. They include, along with Miller and Hamon:

C. F. Bedford, Pan American Petroleum Corp., Tulsa; A. E. Chester, Magnolia Petroleum Co., Dallas; Harold Decker, Highland Oil Co., Houston; A. S. Donnelly, Honolulu Oil Corp., San Francisco; L. E. Fitzjarrald, Phillips Petroleum Co., Bartlesville, Okla.; R. E. Foss, Sunray Mid-Continent Oil Co., Tulsa; W. H. Hunt, Hunt Oil Co., Dallas; James E. Low, Amerada Petroleum Corp., Tulsa; C. T. McLaughlin, Snyder, Tex.

C. D. Mimms, Standard Oil Co. of Texas, Houston; Jerome J. O'Brien, Monterrey Oil Co., San Antonio; Joseph I. O'Neill, Jr., Midland; C. E. Reistle, Jr., Humble Oil & Refining Co., Houston; Hamilton Rogers, Texas Pacific Coal & Oil Co., Fort Worth; Fred W. Shield, San Antonio; J. U. Teague, Columbia Drilling Co., Houston; Jack Vickers, Vickers Petroleum Co., Wichita; Frank H. Willibrand, Sohio Petroleum Co., Oklahoma City; and Frank Zoch, Corpus Christi.

the JOURNAL *said . . . . . .*

50 *years ago*

November 6, 1908

A letter received from a Texas operator at Tampico states that the geyser on Pennsylvania Oil Co.'s property is making perhaps 15,000 bbl. of oil and an enormous quantity of water and solid matter. W. W. Woodworth, a Texas contractor, is building some large earthen tanks to hold the oil.

It was reported several days ago that 50 men had been killed by the poisonous gases emanating from the geyser. No confirmation of this report has been received.

Oklahoma reported 246 completions in October, of which 230 were producers with initial output estimated at 24,145 bbl., an average of 105 bbl. to the well; 15 were dry and 1 gas.

25 *years ago*

November 2, 1933

The accounting departments of oil companies are beginning to use black ink for the first time in several years. Producers, particularly, are in a far better frame of mind and are studying individual properties with a view of reconditioning and increasing production. Companies are preparing to spend a lot of money in the very near future on old properties which have been sadly neglected during the depression.

Prominent among the recent developments in refining practice has been the trend toward the close association of cracking with a variety of other operations. . .

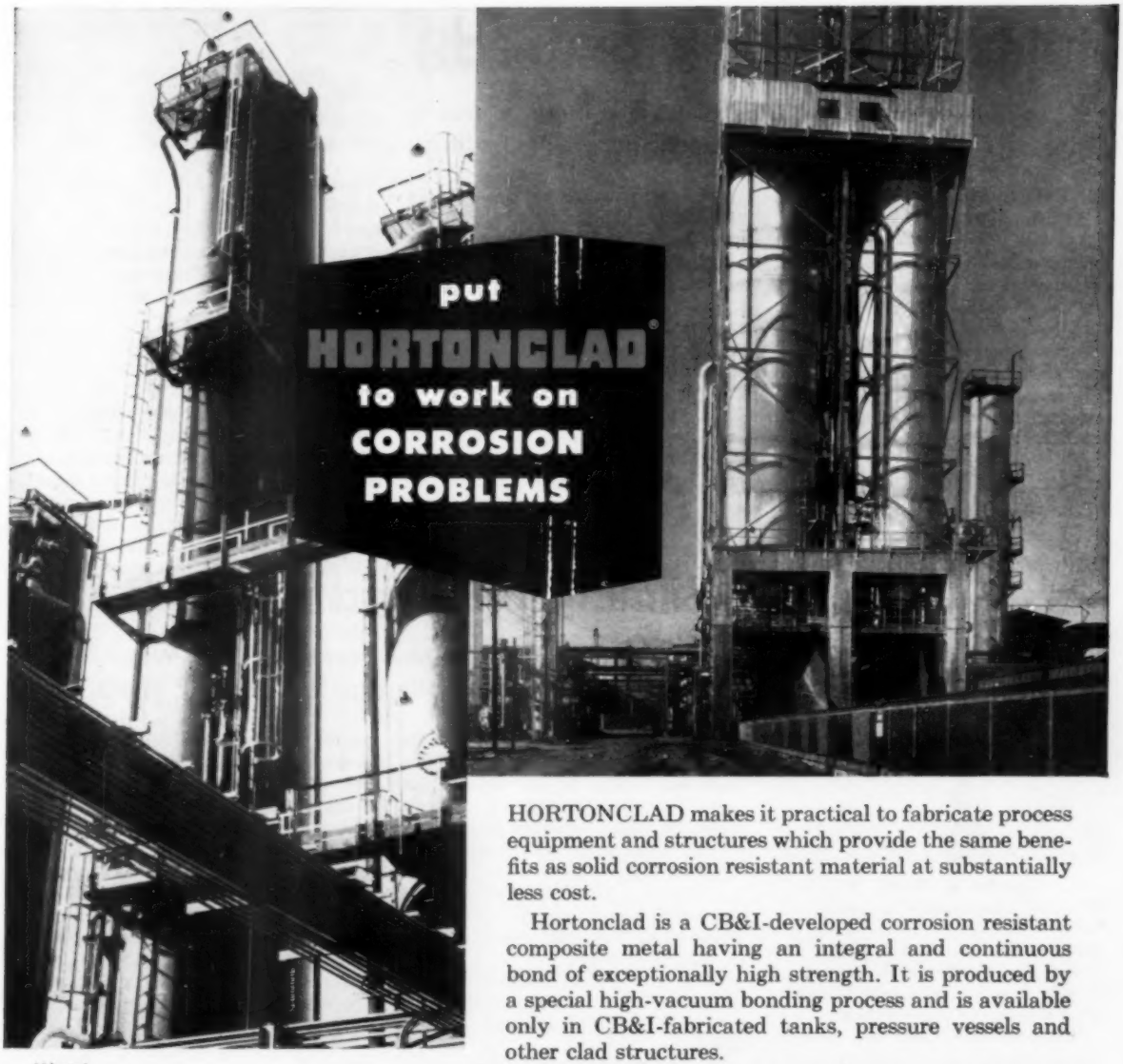
The combination process is appearing in increasing frequency in current construction. Its advent is of general significance in marking a definite departure from the long-practiced segregation of the individual cracking and distillation operations.

10 *years ago*

November 4, 1948

Quick action to "save the tidelands" against an alleged "oil trust" grab was urged upon President Truman in separate letters from Sen. William Langer of North Dakota and the International Association of Machinists. Langer urged that the President take legal action against coastal states where oil companies are drilling the tidelands, while the union asked him to "stop the oil trusts from grabbing the nation's tidelands oil resources valued at $10,000,000,000."

Third quarter reports on the refining industry's expansion program indicate some 150,000 bbl. per day of additional crude-oil charging capacity has been placed in operation during the second and third quarters of this year. This increase brings the nation's total refining capacity, on a crude-oil charging basis, to near the 6.25-million-barrel-per-day mark.



(Above)

ABSORBER TOWER at a Louisiana chemical company has stainless steel Hortonclad shell. Thickness of backing and cladding is 1¼ inches.

(Right above)

COKING CHAMBER at a Kansas refinery uses 405 stainless steel Hortonclad backed by A205 Grade A moly steel.

HORTONCLAD makes it practical to fabricate process equipment and structures which provide the same benefits as solid corrosion resistant material at substantially less cost.

Hortonclad is a CB&I-developed corrosion resistant composite metal having an integral and continuous bond of exceptionally high strength. It is produced by a special high-vacuum bonding process and is available only in CB&I-fabricated tanks, pressure vessels and other clad structures.

Silver, stainless steels (both chromium and nickel) nickel and alloys such as Monel, Inconel, Hastelloys B and F and a variety of other alloys may be employed in the Hortonclad process. Write our nearest office for a copy of the CB&I bulletin which describes:

. . . the benefits of HORTONCLAD

1. Corrosion resistance
2. Economy of design
3. Uniform thickness of clad and backing plate
4. Integral and high strength bond
5. Wide selection of cladding materials
6. Clean contaminant-free surface

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Political Apathy Scored

. . . by oil executive who urges American business men to take greater part in national, local government affairs.

INDIFFERENCE toward politics by the American business man eventually will put him out of business and make him a ward of a socialistic government.

That was the warning sounded last week by Charles A. Perlitz, Jr., Houston, executive vice president of Continental Oil Co.

In a speech in Austin at the twentieth annual conference of the Texas Personnel and Management As-

Charles A. Perlitz, Jr.
". . . stand and be counted."

sociation, he said that business men must realize the threat of the growing political power and public sentiment being marshalled against them.

"Business men have lost their influence in political affairs because they have been apathetic," Perlitz said.

He urged business leaders to participate in a public-spirited and constructive manner in politics and government affairs.

What to do . . . He offered six suggestions for those who want to take a more active and aggressive part in formulating national policies:

. . . Keep informed about public affairs, particularly about what is going on in Washington. Adequate facts carefully interpreted, are needed as a basis for forming judgments.

. . . Take a stand on important issues. Perlitz says, "Study objectively all sides of proposed legislation and have the courage to take a stand one way or the other. Recognize that to run from controversy is to abdicate your opinion. If you fail to stand and be counted you soon may be without a business."

. . . Support and cooperate with the Government. He stated that government regulation and intervention is necessary in many cases. "Blanket, unreasoning opposition to any and all legislative, regulatory, and other government agencies is often self-defeating," he added.

. . . Participate personally in politics on a national, state, or local level.

. . . Encourage political activity by employes. Perlitz said this might include time off for employes to vote, attend precinct meetings, and participate in political campaigns and leaves of absence for employes elected to legislatures.

. . . Do some constructive thinking about the kind of society and type of government you want and then take positive action to bring it about.

What not to do . . . Perlitz also mentioned some things he said business men in politics should not do:

. . . Don't run to Washington or the state capitol for help on all competitive problems that confront your business.

. . . Don't ask for special favors for your company or your industry without carefully reflecting upon the costs of such favors to the economy as a whole.

. . . Don't conduct your business in such a way as to invite federal regulation, prosecution, or control.

Wilmington Flood Expanded

. . . with completion of new injection plant. Water-input rate of 941,000 bbl. daily expected within 3 years.

ANOTHER WEAPON to fight subsidence in California's Wilmington field was added to the arsenal last week with dedication of a new $786,000 water injection plant.

The new plant, with capacity of 120,000 bbl. of water daily, will be used by Long Beach Oil Development Co. in the huge field-wide repressuring program to halt subsidence and increase oil recovery.

This gives LBOD injection capacity of 210,000 bbl. of water daily. Current injection rate is about 115,000 bbl.

S. M. Roberts, Long Beach city subsidence administrator, outlined details of the proposed field-wide flood at dedication ceremonies for the new plant. Here's what the repressuring of the four main upper zones of five of the six fault blocks at Wilmington will involve:

. . . **Injection rate** averaging 941,000 bbl. of water daily over a 5-year period. He said this rate can probably be achieved in less than 3 years.

. . . **Cost of** about $60 million. About $25,509,000 will be in capital investments such as injection plants, and $34,300,000 will go for operating costs, such as water handling and treating.

. . . **About 259 injection wells.** Only 34 are now in operation, taking a total of 143,000 bbl. of water daily in full-scale and pilot floods in the field.

Big recovery . . . LBOD's pilot project in the HX sands of Fault Block V-B in the harbor area produced 1,425,000 bbl. of oil not recoverable through primary means.

A company official said this additional oil was worth $4,200,000 and has more than paid for the company's investment of $3,332,000 in water-injection facilities.

Water injection in the pilot area ranged from 5,000 to 15,000 bbl. daily, restoring pressures to the original 1,200 psi. Pressures had dropped to 930 psi.

Other floods . . . Producing Properties, Inc., has just received state approval to step up its flood in the Ranger zone of Fault Block IV from 4,500 bbl. daily to 22,800 bbl.

At the southeast edge of the field, Monterey Oil Co. and The Texas Co. have announced plans to launch a water flood at their island oil operations off Seal Beach. The area is just outside the subsidence district limits set recently by the state.

Monterey has awarded contract to Healy-Tibbitts Corp. to build a wharf to the island. A water source well and other flood equipment will be housed on the wharf. Actual injection rates weren't disclosed. Monterey, the operator, expects to get the $300,000 flood program under way by February.

Hearings set . . . Meanwhile, Federal Judge Harry C. Westover has set

November 17 as hearing date for arguments for dismissal of the big Government suit against operators.

Attorneys for more than half of the 121 Class A defendents (active operators in the field) have filed motions for dismissal.

The suit was filed for the Navy by the Department of Justice last summer, demanding that operators halt subsidence around the Navy base at Long Beach or shut down the field (OGJ, Aug. 25, p. 52).

Delta Pipeline Being Built

CONSTRUCTION is under way on Shell Pipe Line Corp.'s Delta pipeline, which will replace barge transportation of crude to Shell's Norco, La., refinery.

Glaser Construction Co., Lafayette, La., has a contract to lay 50 miles of 8, 12, and 16-in. pipe. Houston Contracting Co. will lay 65 miles of 20-in. J. Ray McDermott & Co. will install major crossings of the Mississippi River at Nairn and Destrehan as well as three other water crossings.

Delta Engineering Corp., Houston, will construct pump stations at Main Pass, Ostrica, and Pilottown. Station Construction Co., Houston, will build the Norco terminal and Loutre junction facilities. When completed the common-carrier pipeline will move crude from terminals on the southwest and southeast tips of the Mississippi Delta to the Norco plant, 18 miles west of New Orleans. Initial capacity will be 90,000 bbl. daily.

Alberta Nominations Rise

OIL COMPANIES view the increased demand for Alberta crude in November as a sign of better things to come.

Nominations filed with the Alberta Oil and Gas Conservation Board call for 303,086 bbl. daily, an increase of 13,929 bbl. over October's demand of 289,157. November promises to be the best month since last July when nominations hit 335,395 bbl. daily.

Another bright spot is recent completion of two refineries. British American Oil Co. nominated 8,900 bbl. daily for its new 20,000-bbl. plant at Port Moody, B. C. (OGJ, Oct. 20, p. 54), and Cities Service Oil Co. asked for 10,000 bbl. for its new 20,000-bbl. Clarkson, Ont., refinery.

U. S. refiners and their requests are General Petroleum Corp., Ferndale, Wash., 11,500 bbl. daily; International Refineries, Inc., Wrenshall, Minn., 5,000 bbl.; Bay Refining Corp., Bay City, Mich., 4,000 bbl.

Railroad Loses Big Case

. . . in Colorado. State Supreme Court rules against Union Pacific's claim to mineral rights on land-grant acreage.

A 2-YEAR-OLD COURT decision upholding Union Pacific Railroad's claims to mineral rights under land-grant acreage was overturned last week by the Colorado Supreme Court.

The court held that mineral rights on a 160-acre tract in Logan County, owned by Sara Mildred Radke and her brother, Edward F. Karr, belong to them.

The decision could pave the way for many more such suits against the railroad.

There were two principal points at issue in the case.

. . . An 1896 sales contract did not contain a clause reserving "coal and other minerals" to the railroad, although the deed to the property did include it.

The lower court had ruled in December 1956 that the deed took precedence over the sales contract.

. . . The minerals clause which UP had used reserved "the exclusive right to prospect for coal and other minerals and to mine for and remove same if found."

The Colorado high court held that this clause did not give the railroad ownership of the minerals.

"The only reservation was of a right to prospect or explore for them," said the court's decision written by Justice Leonard Sutton. "We hold that a right to prospect for and to remove minerals found, as used here, is not a reservation of an estate in real property but a mere license . . . which cannot be used after the statutory 18-year period without consent of the landowner."

Since the railroad did not exercise its right within 18 years after delivery of the original deed, it lost all rights to the minerals, the court said.

What's involved . . . The Radke-Karr case was filed to clear title to the northeastern Colorado tract after it had been leased to Platte Oil Co. of Wichita, Kans.

The 160-acre tract is part of 16,000,000 acres in Nebraska, Colorado, Wyoming, and Utah received by the railroad as a grant from Congress in 1862-64. UP was to sell the lands to finance construction of its rail lines from the plains westward through the Rocky Mountain region.

The reservation involved in the Colorado suit was a form used by UP for sales of this land-grant property between 1887 and 1915. The court noted that other forms containing different phraseology also have been used, so that the effect of the decision will be limited.

Attorneys were divided over the significance of the ruling. Edward Knowles, Denver lawyer representing UP, said: "We view this as serious but not of great consequence to the oil interests of Union Pacific."

Richard B. Foley, attorney for Karr and Mrs. Radke, contended the case casts doubt on all mineral rights claimed by the railroad in the four states.

Products Line Almost Ready

THE PRODUCTS system of West Emerald Pipe Line Corp. from Amarillo to Albuquerque will start operating this month.

The 296-mile, 6-in. line, built at a cost of $4,000,000, will mean an improved marketing position for the shippers, Shamrock Oil & Gas Corp., The Texas Co., and Phillips Petroleum Co. Shamrock owns two-thirds of the line and Texaco one-third.

Arey Pipe & Construction Co., Inc., and Groninger & King, Inc., are due to complete the line November 15. The line will have two 500-hp. pump stations, one at Dilia, N. M., and another at Tucumcari.

The line, constructed of ultra thin-wall (.188 in.) pipe, will have capacity of 25,000 bbl. daily.

Old Champion Finds Gas Pay

A WILDCAT that once held the world's drilling depth record and was abandoned as a dry hole is being reclaimed as a shallow gas discovery.

The well, located on Millican dome in Brazos County, Southeast Texas, was drilled by Phillips Petroleum Co. in 1945 to the then record depth of 16,655 ft., where it was dry (OGJ, Aug. 18, 1945, p. 98).

Recently, Thomas W. Clay, Tyler, Tex., who had acquired the lease and found other gas production nearby, went back into the old hole. From its shallow Sparta sand at 2,261-66 ft., Clay has brought in a gas well rated good for 15,700 M.c.f. daily, open flow. Shut-in pressure of the well is 940 psi.

Phillips drilled the well as its 3 Schoeps. Clay has renamed it his No. 1 well on the lease.

Another reason why it pays to buy the pipe with the...

Orange Bands

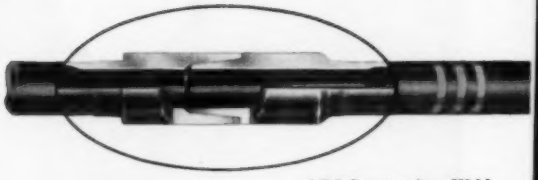
PERFORMANCE PROPERTIES AND SETTING DEPTHS

LIGHTWEIGHT GRADE E DRILL PIPE

SIZE (OD)	INCHES	2⅞"	3½"	4"	4½"	5"
Weight*	Lb./Ft.	6.85	9.50	11.85	13.75	15.0
Wall Thickness	Inches	.217	.254	.262	.271	.296
Tension Data (Minimum Values)						
Load at Minimum Yield	Lbs.	135,900	194,270	230,760	270,030	328,070
Equivalent Length	Ft.	19,840	20,450	19,480	19,640	21,870
Collapse Data (Minimum Values)						
Collapse Pressure	PSI	8,360	8,080	7,080	6,290	6,140
Setting Depth (S.F. = 1⅛)	Ft.	14,900	14,370	12,590	11,180	10,920
Internal Pressure at Minimum Yield	PSI	9,980	9,600	8,660	7,900	7,830

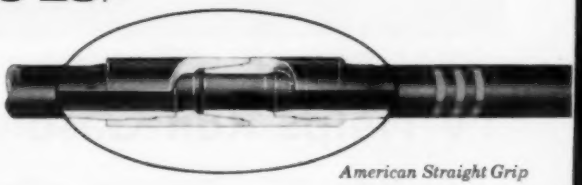
*Tentative API Weights

YOUNGSTOWN LIGHTWEIGHT DRILL PIPE



API Counter-bore Weld

Extends drilling depth, reduces hoisting loads 25% —with your present rig

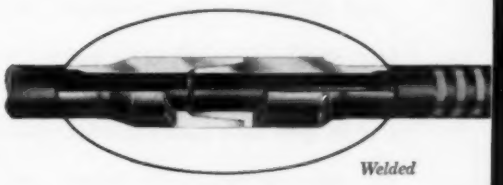


American Straight Grip

Now, Youngstown provides a lightweight drill pipe that will substantially extend your bidding range. You can bid and *get* those deeper drilling contracts—without any changes in your present rig.

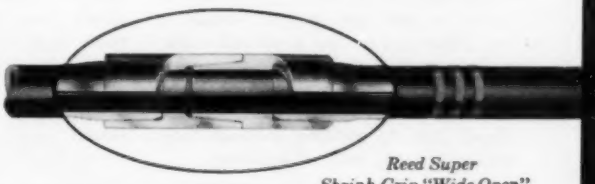
You get more rotating hours with this Orange Band pipe. From ore through final inspection, it is manufactured to rigid drill pipe specifications . . . not a tubing substitute.

On a 10,000-foot hole, a string of 4½" lightweight drill pipe is 18½ tons lighter than 4½" regular drill pipe—because it's 2.85 pounds lighter per lineal foot. This means longer drill strings *without increased weight.*



Welded

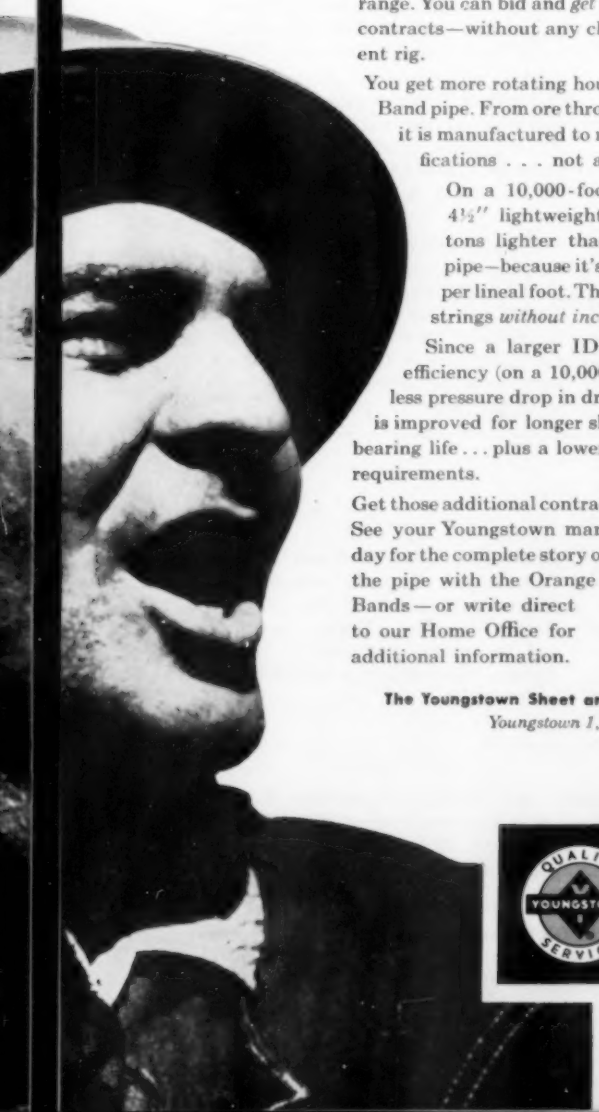
Since a larger ID is used, hydraulic efficiency (on a 10,000-foot string, 16.7% less pressure drop in drilling fluid column) is improved for longer slush pump rod and bearing life . . . plus a lowering of horsepower requirements.



Reed Super Shrink-Grip "Wide Open"

Get those additional contracts now. See your Youngstown man today for the complete story on the pipe with the Orange Bands—or write direct to our Home Office for additional information.

Hughes Seal Grip

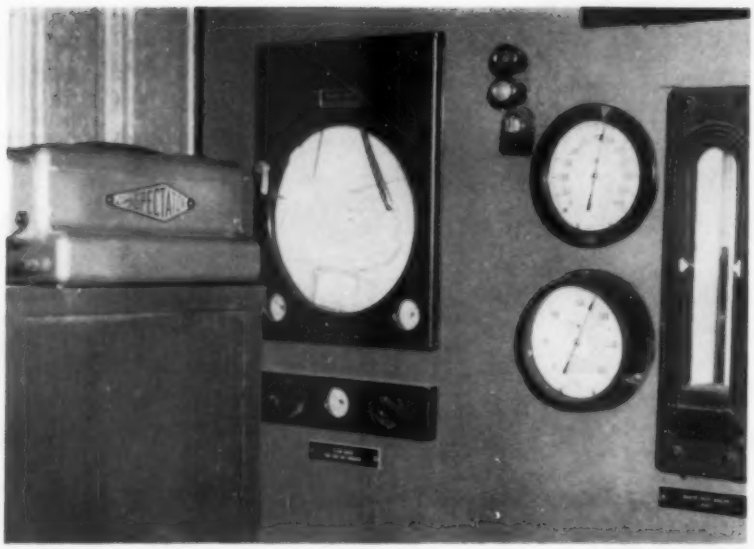


The Youngstown Sheet and Tube Company
Youngstown 1, Ohio

Youngstown Lightweight Drill Pipe
Is Available Threaded or Plain End, Internal or External Upset for Attachment with Above Tool Joints.

QUALITY YOUNGSTOWN SERVICE

Youngstown
SEAMLESS DRILL PIPE • CASING • TUBING



CAMERA WATCHES sulfur-unit boiler controls at Slaughter where . . .

TV Helps Run Gasoline Plant

. . . for Pan Am. Closed-circuit system increases safety and efficiency by constant reading of five instruments.

THE NEW TV SYSTEM at Pan American Petroleum Corp.'s Slaughter plant in West Texas is probably the first of its kind for a natural-gasoline plant.

The setup includes a TV camera transmitter in the sulfur-plant control house, a television picture screen in the boiler house, and a coaxial cable.

This enables the steam-boiler operator to monitor critical control instruments from his central work location about 260 ft. walking distance from the sulfur-unit control building.

The operator is responsible for three steam boilers, two oil-fired heaters, and the sulfur-recovery installation at the plant.

The camera is atop its cabinet housing (left). The camera transmits images of (left to right) the recorder which gives the flow ratio of hydrogen sulfide and air to furnace; closed system condensate alarm; boiler feed water pump discharge pressure (top gage); steam condenser temperature (lower gage); and waste heat boiler water level (extreme right).

Deep Holes Ready

for first tests. Phillips and Shell wells both bottomed.

WITH TOTAL DEPTH at 25,340 ft., Phillips Petroleum Co. planned to perforate the world's deepest hole, the 1-EE University in Pecos County, Texas.

Crews ran 5½-in. liner to 25,328 ft. from 22,919 ft. where 7-in. casing was landed. The Ellenburger objective was topped at 24,974 ft. (OGJ, Sept. 19, p. 33).

At the world's second deepest hole in Elk City field of western Oklahoma, Shell Oil Co. took the 5 Rumberger to total depth of about 24,002 ft. and then plugged back to 22,360 ft. for open-hole test of Springer sand and dolomite.

This hole is cased with 9⅝-in. pipe to 11,500 ft., 7-in. liner to 20,015 ft., and 4½-in. liner to 21,931 ft. Gas shows were encountered in what is believed the Morrow at 21,200 to 21,300 ft. and the Springer sand, topped at 21,485 ft. Best shows were in Springer dolomite below 22,050 ft.

The world's third deepest well, Phillips's 1-A Montgomery 13 miles southwest of the 1-EE University in Pecos County, is still testing perforations at 22,650-880 ft. in the Ellenburger. Total depth of this well is 23,400 ft.

Phillips' other deep test in Pecos, the 1-A Harral, 10 miles southeast of the 1-EE, was being acidized with 12,000 gal. This well went to 19,020 ft. without finding the Ellenburger. On earlier tests it flowed 1,800 M.c.f. daily from perforations at 16,630-70 ft. (OGJ, Sept. 15, p. 109).

PROCESSING BRIEFS

Average quality of premium gasoline throughout the country moved up 0.1 of an octane to 98.7 in October, according to the monthly Ethyl survey. Regular was unchanged from September at 91.4. Premium was up 0.6 and regular 0.5 octane from a year ago.

A new expansion program will add another 69,000 M.c.f. to capacity of the Eunice, La., gasoline extraction plant owned jointly by Runnels Gas Products Corp. and Texas Gas Exploration Corp. The project will boost capacity to 369,000 M.c.f. daily. Fluor Corp., Ltd., has been awarded contract for the $500,000 job. The plant extracts natural gasoline, butane, and propane. Runnels Gas is a wholly owned subsidiary of Union Oil & Gas.

A $1-million contract for construction of a product-separation and treating plant and marine terminal has been awarded by Alaska-Yukon Refiners & Distributors, Ltd., to Fluor Corp. of Canada, Ltd. Contract calls for construction of the 3,000-bbl. plant at Haines Junction, Yukon Territory, and the marine terminal at Valdez, Alaska. Completion is scheduled for spring 1959.

Also for Refiners . . .

IN THE NEWS: Cabinet committee is busy drafting its own idea of a new imports plan (p. 46) . . . Labor's big legislative plan would affect oil (p. 51) . . . Domestic demand will take a 4.5% rise in 1959, IPAA committee forecasts (p. 54) . . . Pan American is operating a closed-circuit TV at its gasoline plant (p. 64).

PLUS THESE TECHNICAL REPORTS: Adsorption process now practical for recovery of natural-gas liquids (p. 74) . . . Role of the pilot plant in processing (p. 90) . . . Planning the turnaround at a small refinery (p. 94).

World Output Is Up

. . . for third straight month and hits second highest peak. U. S. has most gain. Foreign total sets record.

FREE-WORLD CRUDE production rose almost half-million barrels daily in August to reach the second highest level on record.

United States producers gained the most ground with the highest output in over a year. Other areas added enough production to push the foreign total to a new record.

Middle East production was at a new peak due to all-time records in Iran and Iraq. Production in Venezuela was higher than any month since last August.

West Germany continued to edge further ahead as Western Europe's leading crude producer, averaging 88,000 bbl. daily from no less than 77 small fields. The largest, Ruehlermoor, in Emsland, averaged 8,400 bbl. daily. Declining Austrian production was propped up by slight gains in the old Zistersdorf-Gaiselberg fields of Rohoel-Gewinnungs, A.G., operator for Socony Mobil and Royal-Dutch Shell.

TREND OVER LAST YEAR

	Western Hemisphere less U.S.	Middle East	Total Free World outside U.S.
1957			
August	3,924.2	3,955.3	8,655.3
September	3,759.6	3,969.5	8,504.6
October	3,758.8	3,878.9	8,435.5
November	3,654.7	3,704.2	8,412.4
December	3,661.7	3,973.6	8,412.4
1958			
January	3,680.4	4,034.0	8,465.6
February	3,798.7	4,057.6	8,662.1
March	3,672.6	4,243.0	8,631.3
April	3,613.5	4,109.2	8,528.0
May	3,582.9	4,087.8	8,468.2
June	3,678.0	4,156.8	8,654.2
July	3,777.0	4,247.2	8,832.6
August	3,818.5	4,329.0	8,958.2

World-Wide Crude Production: Daily Average in Thousands of barrels

Country—	Aug. 1958	July 1958	Aug. 1957
Western Hemisphere			
Argentina	89.9	89.9	91.8
Bolivia	9.5	9.5	10.0
Brazil	52.3	52.3	30.0
Canada	448.0	473.5	507.9
Chile	15.7	15.7	12.0
Colombia	128.9	128.9	124.9
Cuba	1.0	1.0	1.0
Ecuador	8.6	8.6	9.5
Mexico	261.2	261.2	236.3
Peru	52.9	52.9	54.0
Trinidad	103.8	102.5	95.3
Venezuela	2,646.7	2,581.0	2,751.5
Total	3,818.5	3,777.0	3,924.2
Europe			
Austria	52.2	52.1	58.5
France	27.6	27.7	27.8
West Germany	88.0	87.0	78.6
Italy	29.5	27.9	31.1
Netherlands	29.1	29.1	31.0
Turkey	6.5	6.5	6.8
United Kingdom	1.7	1.7	1.7
Yugoslavia	9.5	9.8	7.7
Total	244.1	241.8	243.2
Middle East			
Bahrain	40.5	40.7	34.1
Iran*	884.0	798.0	768.0
Iraq†	790.6	755.6	491.6
Israel	1.2	1.2	1.2
Kuwait	1,378.7	1,353.5	1,286.0
Neutral Zone	75.0	75.0	74.3
Qatar	169.0	177.0	148.0
Saudi Arabia	990.0	1,046.2	1,152.1
Total	4,329.0	4,247.2	3,955.3

Country—	Aug. 1958	July 1958	Aug. 1957
Other Asia			
British Borneo	110.0	110.0	117.5
Burma	7.2	7.2	8.4
India	8.5	8.5	9.2
Indonesia	325.0	325.0	328.0
Japan	7.0	7.0	6.3
New Guinea	5.5	5.5	6.2
Pakistan	5.9	5.9	6.0
Total	469.1	469.1	481.6
Africa			
Algeria	11.1	11.1	0.2
Angola	4.0	4.0	. . .
Egypt	65.2	65.2	45.8
Gabon	9.1	9.1	3.5
Morocco	1.5	1.5	1.5
Nigeria‡	6.6	6.6	. . .
Total	97.5	97.5	51.0
Free World			
Foreign	8,958.2	8,832.6	8,655.3
United States	6,939.0	6,571.0	6,786.0
Total	15,897.2	15,403.6	15,441.3
Communist Countries in Soviet Orbit			
Romania	223.0	223.0	220.0
Russia	2,230.0	2,230.0	1,975.0
Others	60.0	60.0	50.0
Total	2,513.0	2,513.0	2,245.0
WORLD TOTAL	**18,410.2**	**17,916.6**	**17,686.3**

*Includes estimated 5,000 bbl. daily from Naft-i-Shah field not operated by consortium companies. †Includes estimated 3,600 bbl. daily from Naft Khaneh field, operated by British Petroleum Co. ‡Test production.

Figures are from reliable industry reports or government sources. Estimates are made where complete reports are lacking.

BP, Sinclair Working Out Big Deal

• The two companies are planning a joint operation in the Western Hemisphere. Partnership will give Sinclair a Middle East crude source and permit BP to search for oil in South America.

TWO OF THE WORLD'S major oil companies flew in the face of Kipling's classical "never the twain shall meet" admonition last week and began welding an East-West partnership that could change the character of both.

Crude-short Sinclair Oil Corp., a major U. S. refiner and marketer, and British Petroleum Co., a big Eastern Hemisphere oil power with a surplus of Middle East oil, are joining hands.

Final details of the partnership are still being worked out, but two big mutual advantages to the deal are these:

... **Sinclair** gets a long-term assured source of Middle East crude without the financial and political risks involved in developing the supply itself.

... **British Petroleum** gets an entree to Western Hemisphere marketing that would be hard to establish any other way. More important, British Petroleum can now hedge its healthy but sometimes politically shaky Middle East oil sources with Latin American oil.

Controlled by the British Government, BP has been excluded either by law or fiercely jealous nationalism from Latin American oil countries.

In a joint announcement last week, the two companies gave only the barest outline of their future plans. Both expressed enthusiasm for the unique partnership as mutually beneficial.

One Sinclair official described the deal privately as a "dynamic, forward-looking arrangement that will grow in scope as it goes along."

Here are the three basic features of the agreement so far:

... **A long-term supply** agreement covering Sinclair's domestic requirements for Middle East crude.

... **A joint marketing** company with the primary purpose of selling both Middle East and Venezuelan crude in the Western Hemisphere.

... **A joint exploration** and production company to operate primarily in Latin America.

The two companies emphasized that the new agreement is not exclusive. They agreed, however, that the new deal would give each added strength and greater flexibility of crude supplies and markets in both hemispheres.

The Middle East oil . . . British Petroleum controls more of the production of the lush Middle East oil area than any other single company.

BP's share of Persian Gulf oil output in 1957 was just about 1 million barrels a day. It's another 200,000 bbl. daily higher today. About all that holds it down is an available market.

Little Kuwait, where BP and Gulf Oil are equal partners, is the biggest single source. Right now BP's share amounts to about 660,000 bbl. daily. That's almost exactly the total throughput of BP's refineries in Kuwait, Great Britain, Aden, France, Germany, Italy, Israel, Belgium, and Australia.

Another 540,000 bbl. daily of Middle East production from Iran, Iraq, and Qatar is surplus crude. BP's 40% share of the Iranian Consortium gives it 320,000 bbl. daily; it's 23.75% of Iraq Petroleum gives it 170,000 bbl. daily; and the same ownership in Qatar Petroleum furnishes another 40,000 bbl. daily.

Curbed by U. S. import controls, Sinclair now buys only about 10,000 bbl. daily of Middle East crude. The company regards this as only a temporary condition. The balance of Sinclair's 53,700-bbl.-daily import allocation comes from its own Venezuelan fields.

On a short-term basis, Sinclair's 10,000-bbl.-daily needs won't make much of a dent in BP's supply of Middle East crude, but Sinclair is obviously looking at the years to come.

A Sinclair official said his company expects at least a 50% increase in U. S. domestic demand in the next 10 years.

"This means Sinclair is going to require more and more imported oil as years go by," he said.

Sinclair expects no cutback in its domestic producing operations, but frankly doesn't believe that the most expansion possible can keep pace with future demand for oil in the U. S. Sinclair produces oil in 15 states, in Canada, and Venezuela. But, its current total production of 180,000 bbl. daily from all sources falls far short of the 478,000 bbl. daily capacity of its six refineries in the U. S. and one in Venezuela.

Sinclair feels frankly that it can now concentrate on its expansion without "keeping one eye riveted on the Middle East as a source of supply." The company had Middle East interests in the early 1900's, but backed away from that part of the world long before it became a prime oil-producing region.

The marketing company . . . British Petroleum's $2,220,000,000 in sales last year made it the second largest international oil company based on sales, but its activities are all confined to the Eastern Hemisphere.

The company is building a 30,000-bbl.-daily refinery at Ville D'Anjou, Que., for its first try at breaking into refining-marketing in the west with a Canadian operation. The refinery will not be completed until Mid-1960. In the meantime, the company is buying retail gasoline outlets in Canada. By the end of this year it expects to have at least 700 service stations.

Sinclair, as a major North American marketer, shrugs off any suggestions that it would take over BP's marketing problems in Canada with the comment that the two companies will work "together."

The formation of a marketing company specifically to sell both Middle East and Venezuelan crudes in the Western Hemisphere certainly indicates plans for a major expansion of Sinclair's present Venezuelan holdings.

The present Sinclair output of slightly less than 64,000 bbl. daily in Venezuela is easily absorbed by the company's own import quota plus the 35,000-bbl.-daily needs of its own refinery at Puerto La Cruz.

The exploration company . . . The joint exploration company, Sinclair insists, carries no special emphasis for Venezuela, but British Petroleum has long looked for an opportunity to acquire producing properties in Latin America, especially Venezuela.

Because the British Government owns about 55% of the voting stock, BP has not been eligible to take part in exploration in Venezuela. Venezuela's law prohibits such activity by a company controlled by a foreign government.

BP would have no such problem in a partnership with a privately owned company such as Sinclair. The

partnership would dilute the government ownership of the joint company well below a controlling point.

Sinclair said last week that the joint company will not confine its activities to Venezuela, but it would operate primarily in Latin America.

"Plans are in process for several areas," Sinclair said.

Financial angle . . . Because it is a refiner on balance and profit margins in refining and marketing have been pinched severely in recent years, Sinclair is not in the healthy cash condition enjoyed by some big U. S. oil companies.

The companies with heavy producing properties have been able to live pretty largely off profits from crude and slip past refining activities with slim margins.

Because it is a heavy crude buyer, Sinclair has a larger long-term debt than most U. S. integrated companies. At the beginning of 1958 it was $341 million.

British Petroleum is in a very healthy cash condition, but its currency is in sterling.

Sinclair last week discounted speculation that capital was a factor in the new agreement. The company is rather proud of the fact that its standing and credit is good enough to have a large debt.

"We expect this new joint venture to generate its own capital needs," a Sinclair official said. "There is no consideration for acquiring new capital involved."

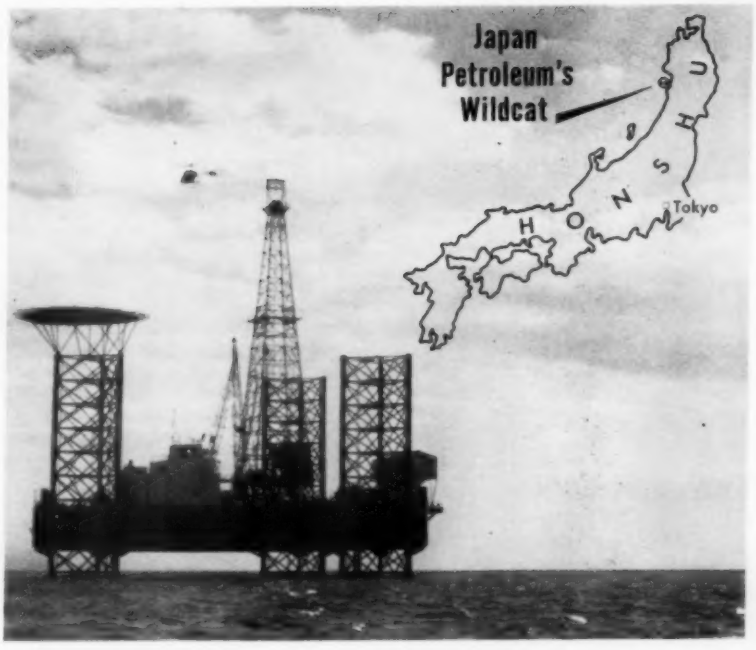
Libyan Wildcat Has Show

ANOTHER LIBYAN wildcat has had a show, but the well is drilling ahead after only small amounts of gas were recovered with mud and salt water on a drill stem test.

Esso Standard (Libya), Inc., ran the test on a section between 6,120-67 ft. in El Bdea 1. A trace of gas also was found at 6,073 ft. in a low-porosity zone. The well is drilling ahead at 6,210 ft.

El Bdea is Esso Standard's third test in north-central Libya. It is within a few miles of the Gulf of Sirte on the Mediterranean, and about 120 miles northeast of the two discoveries by Oasis Oil Co. of Libya.

Oasis Oil, operator for Ohio Oil Co., is making full-scale tests on Dahra B-1-32. These may take up to 3 weeks. But regardless of the outcome, more wells will be drilled to outline the extent of oil pools tapped by Dahra and by Bahi 1, 24 miles north (OGJ, Oct. 20, p. 66).



Japan Launches Offshore Program

JAPAN'S first offshore drilling platform will scarcely get its feet wet before pulling into harbor for the winter.

The outfit has started Japan's first offshore well in the Sea of Japan off northwest Honshu, the main island. Michikawa-oki S.K. No. 1 is a little over 1 mile from shore on the crest of one of four anticlines extending 37 miles along the coast.

Japan Petroleum Exploration Co. assembled the LeTourneau platform to wildcat and, it hopes, develop the structures. Drilling is being supervised by Zapata Off-Shore Co., Midland, Tex. Its timetable calls for completion of the Michikawa-oki test at a depth of up to 5,000 ft. in 45 days. After completion, the platform will be towed to nearby Akita harbor as a precautionary measure because of high winds during winter months. During the next drilling season, from April to November, five more wells are planned.

Outcome of the offshore program will probably determine how close the company comes to meeting its long-range goal. When Japan Petroleum was formed 3 years ago, its target was to boost crude production from 6,000 bbl. to 18,000 bbl. daily by 1960.

Shell Joins Australian Hunt

NEGOTIATIONS are in an advanced stage for an agreement giving a Royal Dutch-Shell company an interest is West Australian Petroleum Pty., Ltd. (WAPET), the operator on a 300,000-sq.-mile concession in Australia.

WAPET in 5 years has spent nearly $33 million and drilled 58 wells without a commercial discovery.

Until now, two American companies each have held 40% interest in WAPET. They are California Asiatic Oil Co., a subsidiary of Standard Oil Co. of California, and Texaco Overseas Petroleum Co., a subsidiary of The Texas Co. A local Australian company, Ampol Exploration, Ltd., has held the remaining 20%.

Interests are being reshuffled to give Shell equal participation with California Asiatic and Texaco Overseas. Each of the three companies will hold two-sevenths. Ampol Exploration will hold the remaining one-seventh.

Exploration play in West Australia has been among the world's most frustrating ventures. The first well on a concession larger than Texas came in as a flash-in-the-pan discovery, and the only find so far. Work is now concentrated in the Kimberley region of Northwest Australia, where oil shows were found in the two latest wells.

Mobile Platform Heads for British Borneo

A DRILLING program in the South China Sea off British Borneo will resume in a few months after the arrival of a new mobile drilling platform.

The "Orient Explorer" has been launched in Southhampton, England, and the long tow to Borneo will begin as soon as the platform is outfitted. The DeLong unit is designed to drill in water up to 120 ft. deep and to withstand 100-m.p.h. winds and 30-ft. waves. It is the first mobile platform built in the United Kingdom.

The 5,400-ton platform is 190 ft. by 106 ft. It will rest on four caissons. 235 ft. by 10 ft. The rig will have a maximum depth of 12,000 ft.

Brunei Shell Petroleum Co. will use the platform to continue its exploration program off the north coast of British Borneo. Four wildcats drilled from three fixed platforms in the area were all unsuccessful. One was at Ampa Patches, about 20 miles off Brunei. Two were at Siwa, 8 miles off Sarawak. The fourth was at Hankin, 30 miles off North Borneo.

Shell starting looking offshore for new reserves after a costly postwar program on land had poor results. Its production in Brunei and Sarawak has declined to 110,000 bbl. daily.

Phillips Scores With Find

. . . on expensive tract in Lake Maracaibo. It is the most southern and western discovery made to date in the lake.

PHILLIPS Petroleum Co. has made the first discovery on Block 17, one of blue-chip tracts of Lake Maracaibo acreage awarded last year by the Venezuelan Government after competitive bidding.

Phillips Petroleum is tight-lipped about test figures and depth of LPG 13-2. But it does confirm the wildcat is a discovery. The well was the second drilled on Block 17. The first, LPG 17-1 on the northern edge of the concession, was a dry hole.

The new producer is 5½ miles southwest of the nearest production, Cia. Shell de Venezuela's VLE 196-X, on Block 7. Shell has said nothing about this test or another well in the western part of the block. But reports from Venezuela indicate VLE 196-X, at 13,038 ft., and VLE 198, at 14,122 ft., both are making over 2,000 bbl. daily on tests.

Phillips already has started a new well on Block 12. The LPG 14-3 is 1¾ miles southeast of the discovery, drilling ahead at about 9,300 ft.

The 24,710-acre block cost $32,349,837, or $1,309 per acre. Phillips, with 55% interest, is the operator. Its partners are Sunray Mid-Continent, Ashland Oil & Refining, Kerr-McGee, Pacific Petroleum, Canadian Atlantic, Western Natural Gas, and El Paso Natural Gas.

Reds Deal With Argentina

THE RUSSIAN Government last week was reported to have offered Argentina a $100-million credit for the purchase of Russian oil equipment.

A State Department spokesman said the Russian deal is not expected to have any effect on the plans of private U. S. companies to take part in Argentina's $800 million development program (OGJ, Oct. 20, p. 71).

Maracaibo Crude Shipped

VENEZUELA Atlantic Refining Co. shipped its first 135,000 bbl. of Lake Maracaibo crude last week from a new terminal to the parent company's refinery at Philadelphia.

The new $3-million Punta de Palmas terminal on the west lake shore 30 miles south of Maracaibo was just completed. It will be used by Atlantic's other partners in the lake development where the group has completed 15 producing wells. The other companies are Venezuelan Sun, Texaco Seaboard, Pan Venezuelan, and the Signal-Hancock group.

Drilling Due Off Neutral Zone

. . . under service pact between International Drilling Co. and Japanese firm. First test slated in about 5 months.

A 2-YEAR CONTRACT will pave the way for the first drilling on the new concessions in the Middle East which depart from the standard 50-50 profit split.

International Drilling Co. will probably spud the first wildcat about April 1 next year. The location is expected to be somewhere in Block A, in the southwest corner of the offshore concession held by Japanese.

Arabian Oil Co., the Japanese firm, hopes to complete five wells on Block A next year. Seismic work is now concentrated in this area, which offsets to the north Saudi Arabia's Safaniya field.

If commercial production is developed, the Japanese will pay the Saudi's up to 56% of half the net profits, and Kuwait, 57% of the other half. Negotiations which broke the 50-50 split were made with both Saudi and Kuwait (OGJ, May 19, p. 116).

The Hague-based contractor was one of five firms negotiating for the contract in Tokyo. Its 2-year agreement with Arabian Oil is a package deal under which it will supply ships, crew boats, and all onshore facilities. These will include dock facilities, a supply depot, and crew quarters. Arabian Oil will supply casing, pipe, bits, and other expendable items.

The contract will be signed within 2 weeks. It will then be submitted to the Japanese ministry of international trade and industry for approval and for foreign exchange allocation.

International Drilling's first move will be to conclude a contract with Reading & Bates Offshore Drilling Co., Tulsa, for use of the C. E. Thornton, a recently completed LeTourneau-type mobile platform. If a deal is made for the Reading & Bates equipment, the platform and a tender will be towed from the U. S. Gulf Coast to the Persian Gulf. The trip would take about 4 months. The platform is equipped with a National 110 rig.

Arabian Oil will know the results of seismic work within a few days when Dr. Takato Fuchita returns to Tokyo with the data. Dr. Fuchita, a University of Tokyo engineering professor, was sent to the Neutral Zone by the international trade ministry to verify foreign-exchange requirements.

The Japanese company has beefed up its staff with the addition of Ryu Funakoshi, former head of the Akita office of Teikoku Oil Co. Funakoshi, who will be named a director of Arabian Oil, had his early drilling experience with North Sakhalin Oil Co., a prewar Teikoku affiliate. He will be in charge of engineering with offices in Kuwait.

Creole Completes

gas conservation plant in Venezuela. Another is due.

THE THIRD GAS conservation plant in the Bolivar Coastal field properties of Creole Petroleum Corp. has gone into operation, and a fourth is under construction.

Tia Juana 3 has started injecting gas at an initial design rate of up to 150 million cubic feet daily. Work has begun on Bachaquero 1, a plant of the same size. When it is completed in 1960, Creole's four lake plants will be able to return gas to Bolivar reservoirs at the rate of 777 million cubic feet daily.

Bachaquero 1, like Tia Juana 3, will be equipped with seven gas turbines developing a total of 56,000 hp. These will drive seven centrifugal compressors arranged in series.

Bachaquero, like the new Tia Juana plant, also will have a platform big enough to permit future expansion if and when additional gas becomes available. About 2½ years of production, wildcat drilling, and study will be needed to determine whether reservoirs in the Bachaquero area are suitable for injection.

If they are, the plant will be expanded. But gas coming from the plant in the first stage of development will be sent to the delivery system of the three Tia Juana plants.

Tia Juana 3 is 2 miles south of Tia Juana 1, and 3 miles west of Tia Juana terminal. Gas enters at 19 psi. and is compressed to 2,000 psi. for injection, and 775 psi. for gas lift. Up to 3,200 bbl. daily of condensate is produced. This can be sent to a flow station for mixing with crude, or to the LPF plant at Ule.

The new station is built on a 550-ft. by 136-ft. platform resting on 414 piles. Water depth is 47 ft. Depth of water at the Bachaquero site is 75 ft.

Creole has smaller compression plants in other producing areas, San Joaquin, Mulata, Jusepin, Quiriquire, and Cumarebo. These reinject up to 92 million cubic feet daily. The company also participates with other firms in joint conservation projects.

Japan Makes Pact

for Russian crude. Barter plan is being considered.

JAPAN'S FIRST postwar contract for Russian oil has been signed for 80,000 bbl. of North Sakhalin crude.

Sogo Trading Co. will pay Soviet Oil Export Corp. $2.19 per bbl. for the 33°-gravity crude, c.i.f. Japan (cost, insurance, freight). Because Japanese shipping is not allowed in Okhotsk Sea waters, a Soviet tanker will pick up the crude at Okha and deliver it to Kikuma on Shikoku Island. From there the oil will be transferred to the 5,000-bbl. refinery of Taiyo Oil Co. at Kameoka.

The North Sakhalin crude is more a token to Japan than a regular source of supply. Most of North Sakhalin production comes from fields developed under Japanese concessions prior to World War II.

Both the Soviets and the Japanese ministry of international trade and industry have been trying to promote the purchase of Russian crude. The ministry earlier this year made a special foreign exchange allocation for Baku oil. But because of high prices and low quality, there were no takers.

Russia recently proposed a $10-million barter plan under which it would trade raw materials for Japanese steel products.

Paria Well Is Abandoned

PARIA OPERATIONS, Inc., has abandoned the second well drilled on its $100-million acreage in the Gulf of Paria.

Posa 103-A-1 was located 4 miles northwest of the Posa 112-1 discovery. The first well is rated at 2,000 bbl. daily. Reports from Venezuela indicate the second well was given up at 12,626 ft. because it was impossible to correlate the test with the discovery. Casing had been set below 11,000 ft.

The rig is being moved to another platform 8½-miles farther northwest for the third wildcat.

Partners in the venture paid Venevuela more than $100-million last year for six blocks covering 153,000 acres in the waters between Venezuela and Trinidad. The Texas Co., Continental Oil Co., and Ohio Oil Co., own 25% each, Cities Service, 16 ⅔%, and Richfield Oil Corp., 8 ⅓%.

Congrats and $25 to Mr. D. J. SUGGS, Republic Natural Gas Co., Tipton Bldg., Pauls Valley, Okla., for this quip.

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Transducers protect large centrifugal pipeline pumps

Custom-built protective devices for pressure, temperature, and vibration have succeeded and become standard instrumentation.

BY W. W. HOLT, JR.
Plantation Pipe Line Co.

NEW electronic protective equipment for large unattended pumping units, developed because available equipment was inadequate, has provided more accuracy and better repeatabilities. It has also increased the rates of response of the temperature, pressure, and vibration shutdown functions.

This in turn affords better protection to the pipeline pumping units and has reduced costs and down time for maintenance.

New equipment has been easy to install, calibrate, and place in operation by pipeline personnel. It has been found that the installation time is less than that required in previous years.

Greater economies are realized from this equipment when it can be incorporated in a station of new design. There the full advantages of fewer conduits and cables between the pump and switchgear rooms are realized.

Presented at University of Oklahoma automation conference, Norman, Okla.

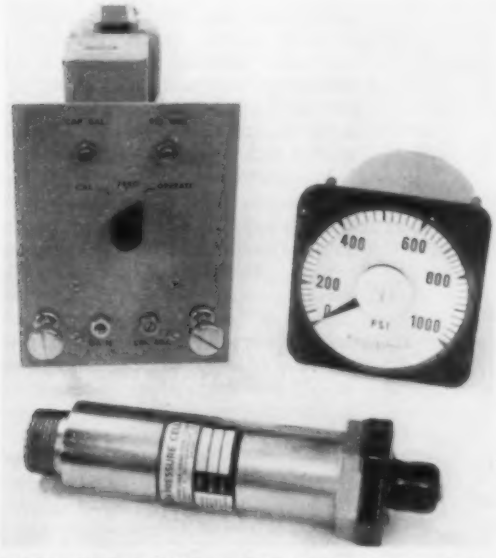
The shutdown and signal circuitry is then all contained in the switchgear room and can be placed in wiring troughs instead of conduit.

The word "transducers" here will be limited to pressure, temperature, and vibration-sensing elements in such forms as make them applicable to large centrifugal pipeline pumps. Although experience has been limited to this application, they should help protect any heavy machine which has high rotational speed.

Pressure-Measurement Devices

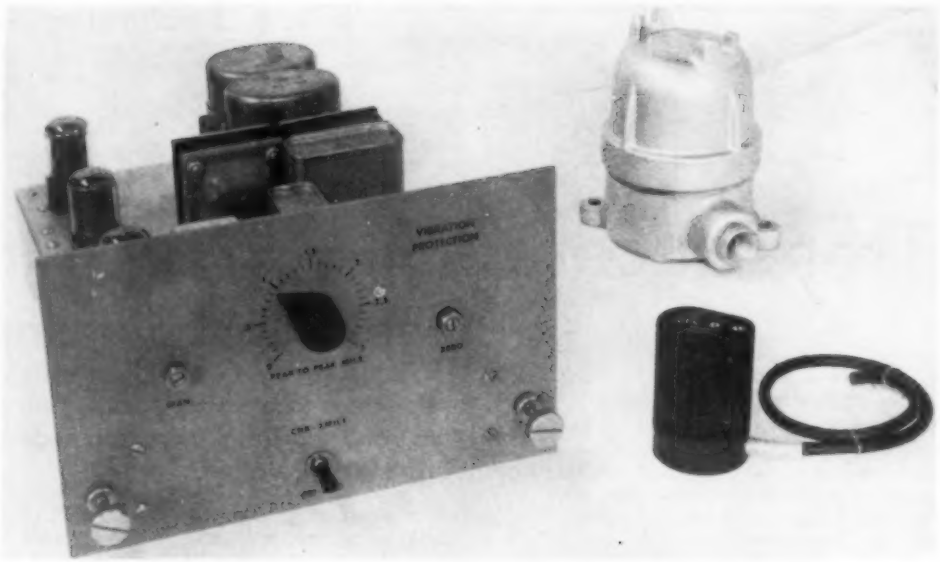
In the late 1940's, the pipeline industry realized that mechanical devices then available on the market were becoming inadequate for accurate and dependable pressure measurement. Line pipe, pumps, and auxiliary-station equipment were being operated closer to their maximum limits for higher efficiencies and this required an improved type of instrumentation. Many types of pressure transducers which converted pressures to electrical signals appeared. Most of these offered similar advantages, such as:

1. Elimination of small-diameter liquid lines.
2. Elimination of inflammable liquid in safe areas such as control and switchgear rooms.
3. Improved accuracy of measurement.
4. Faster response to changes in pressure.
5. Better stability which results in



PRESSURE-MEASURING SYSTEM of the bonded strain-gage type. The strain-gage cell is attached directly to the pipe with the necessary valve, tee, and fitting for attaching a deadweight tester for calibrations.

PRESSURE-PROTECTION UNIT contains two independent set-points, one for low pressure, the other for high pressure. Both set-points are uncalibrated and are set when known pressures applied to the pressure cell by means of a deadweight tester.



VIBRATION - protection system monitors the vibration amplitude of the pickup, which is mounted on the outboard bearing of the pump and motor combination.

fewer calibrations to maintain the required accuracy.

6. Long service life.

7. Easier maintenance and replacement.

8. Remote reading gages up to 1,000 ft. from the sensing element.

9. Competitive first cost in new construction.

This discussion on pressure transducers will be limited to those of the bonded strain-gage type, because the author has had more experience with these.

Strain-Gage Cell

With this pressure-measuring system, the strain-gage cell is attached directly to the pipe with the necessary valve, tee, and fitting for conveniently attaching a deadweight tester to be used for calibrations. Rigid conduit and four-conductor shield cable connect between the cell and the amplifier, which should be located in a safe area such as the switchgear or control room.

A single RCA 5695 Red Base tube is used as a two-stage amplifier. The input to the amplifier is 0-10 mv. a.c., which corresponds to the pressure range of the cell. The amplifier output is 0-5 volts a.c., and is used to drive a rectifier-type voltmeter which is graduated in pressure corresponding to the range of the cell.

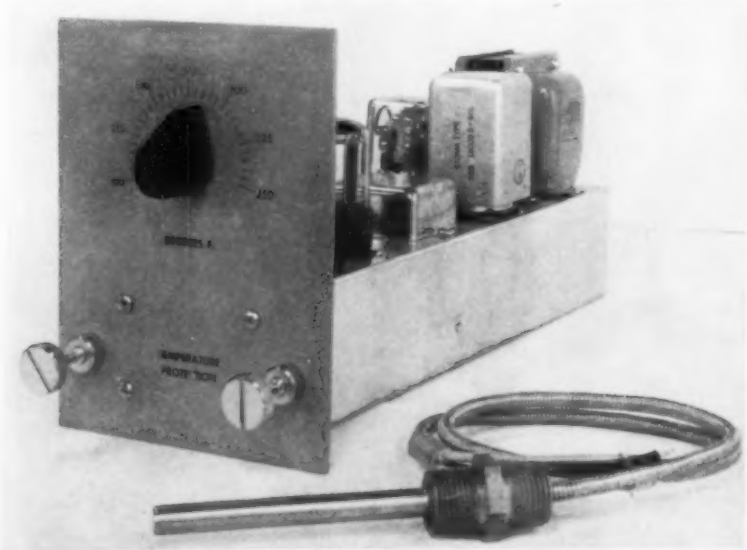
The meter can be located up to 600 ft. from the amplifier. Although calibration requires two men, one at the cell with a deadweight tester and the other at the amplifier, it is a simple and quickly accomplished operation.

With no pressure on the cell, the capacitance and resistance of the cable length is balanced with adjustments on the amplifier to "0." Then, with test pressure on the cell, the gain of the amplifier is set. A calibration switch is provided to give an electrical reference signal which is used as a quick calibration check of the system.

The amplifier is of the plug-in type and therefore readily removable for repair or replacement. Deadweight calibration is normally set up on an annual basis, but should be performed as soon as the electrical reference calibration indicates an "error" in the system. Normal tube life will be 10,000 to 20,000 hours and longer in some cases. Cell life seems to be unlimited.

Pressure overrange of 125% has no effect on the cell, but 150% overrange might produce a slight zero shift. This shift is readily adjusted without affecting the linearity. Cells should be mounted with the liquid connection downward so that entrained moisture will not collect in the cavity. Conduit connections should not impose any load on the cell because mechanical damage might result.

Vibration will not affect the performance of the cell. Pulsating pressures are damped out by the meter and steady indications result. Many of these pressure-measuring systems with five and seven channels have given satisfactory service for more than 8 years.



TEMPERATURE-PROTECTION UNIT works with special resistance bulbs to form a high-limit protective system.

Many applications of this system in remote, unattended pumping stations have required pressure telemetering. This is readily accomplished with a simple converter without vacuum tubes which changes the 0-5 volts a.c. output of the amplifier to 0-50 or 0-100 mv. d.c. This signal is then used to drive the telemetering transmitter. These units have been very stable and trouble-free.

New Protective Devices Designed

In 1955, larger pumping units were being installed, line capacity was to be increased and more efficient operation was desired. A survey of available protective devices for large centrifugal pumps and electric motors revealed that instrument manufacturers had lagged. The available equipment was judged inadequate. Accuracy limits were broad, time lags were excessive and maintenance requirements were high.

Desired specifications were prepared and experimental protective devices for pressure, temperature, and vibration were custom built and tested. The results indicated that the performance specification limits had been satisfied or improved upon, the safety requirements were adequate and the reliability was excellent.

This equipment was then redesigned for optional use incorporating simplified controls, more compact construction, and plug-in units. Additional safety features were added for unattended operation. With the construction of new automatic stations and additions of larger pumping units at main-line stations in 1956, this gear was installed as standard protective instrumentation.

Pressure-Protection Unit

The pressure-protection unit contains two independent set-points, one for low pressure, the other for high pressure. When the pressure on the cell falls below the suction set point, two pairs of relay contacts become closed. Similarly, two other pairs of relay contacts close when the pressure exceeds the high set point.

The low set point covers the range of approximately 0 to 10% of pressure-cell capacity, while the high set point covers the range of 0 to 130% of pressure-cell capacity. The differential between pull-in and dropout of the low set point is about 0.33% of pressure-cell capacity, while that of the high set point is about 2%.

Both set points are uncalibrated and are set when known pressures are applied to the pressure cell by means of a deadweight tester. The front panel of the pressure protection unit also contains a meter and two other

"In 1955 . . . a survey of available protective devices for large centrifugal pumps and electric motors revealed that instrument manufacturers had lagged."

controls, labeled "phase," and a two-way switch, one for each set point. The phase controls and the meter are used only during adjustment of the set points, and the meter serves no further purpose than this.

To achieve the desired repeatability of the pressure set points, the protection unit operates on the "error" between the setting of each set point and the output of its associated pressure amplifier. A separate circuit employing a single vacuum tube is used for each set point.

The error voltage is first amplified and then fed to a phase-sensitive detector incorporating a sensitive relay, which in turn actuates a power relay. Since a number of pressure-protection units can be operated from the output of a single pressure amplifier, any desired number of set points can be obtained for alarm and control action based upon the pressures existing at a single cell.

In the pressure-protection unit, as in the other protective units described below, all relays are energized during normal operation, thereby providing fail-safe action in the event of tube or relay failure.

Pickup and Vibration

The pickup and vibration-protection unit monitors the vibration amplitude of the pickup which is mounted on the outboard bearing of the pump and motor combination. Since the pickup generates a voltage proportional to velocity by means of a permanent magnet moving relative to a coil, it is necessary to convert this output to a voltage proportional to amplitude through the use of an integrating network.

This integration is accomplished within vibration-protection unit after the pickup signal has first been amplified, after which the signal is further amplified and then rectified to produce a d.c. voltage proportional to peak-to-peak vibration amplitude.

This d.c. voltage is compared with an opposing d.c. voltage at the arm of the set-point potentiometer which is energized through a resistance network from a regulated d.c. source. When the vibration amplitude exceeds the set point, the plate current through a sensitive relay is reduced to the level where the relay falls out, thereby actuating a double-pole power relay for alarm and shutdown functions.

The range of the vibration-protection-unit set point is 0 to 3 mils peak-to-peak amplitude, and the set point is adjusted, using a pointer knob against a calibrated scale. Zero and span controls are also provided, and the span control may require adjustment once every 6 months.

A front-panel lever switch with spring return permits checking of the calibration. The accuracy of the set point is within 3½% of full scale and the difference between pull-in and dropout is about 2% of full scale.

Since the vibration-protection-unit set point is calibrated, it permits the measurement of vibration amplitude under operating conditions, it being necessary only to turn down the set point until the alarm circuit is actuated.

Temperature Protection

The temperature-protection unit and special resistance bulbs work in conjunction to form a high-limit protective system. The set point is adjustable over the range of 140° to 210° F. by means of a pointer-knob on a calibrated scale. The accuracy of the set point is within 2° F. at 200, while the differential between pull-in and dropout of the power-relay contacts is less than 2° F. This small differential has proved advantageous in reducing the time required for getting a pump back on the line once it has shut down from high case temperature.

No calibration adjustments are provided on the temperature-protection unit since the calibration is set by the manufacturer and is affected only by the extreme deterioration in characteristics of the single premium vacuum tube it employs.

The resistance bulb is used as a part of a bridge circuit, which also contains the set-point potentiometer. In this case, as in the circuit of the pressure-protection unit, an error voltage is obtained whose phase and magnitude are dependent upon the difference between the set-point value and the value of the physical quantity being monitored. This error voltage is then amplified and fed to a phase-sensitive detector containing a sensitive relay which in turn operates a double-pole relay.

Because of the calibrated set point of the temperature-protection unit, it can be used for measuring bearing and pump case liquid temperatures during operation by simply turning down the set point in question until the alarm is actuated.

GASOLINE-RECOVERY UNIT, equipped with heat stabilizer, utilizes new adsorption process for recovering hydrocarbon liquids from natural gas.

Adsorption process now practical

GASOLINE and hydrocarbon recovery from natural-gas streams by the adsorption process has finally reached commercial maturity nearly 40 years after its first introduction to the industry. During the past 2 years the commercial feasibility of raw-gasoline recovery from natural-gas streams by means of a dry extraction process has been well established.

The development and adoption of this new dry extraction process has filled an industry-wide need for a field-processing method to treat relatively small or lean natural-gas streams which cannot be processed economically by means of conventional oil absorption or refrigeration plants. About 10,000 million cubic feet per day of such untreated natural gas streams is currently being produced in the United States.

The commercial possibilities of hydrocarbon recovery by means of a dry adsorption process were recognized a few years ago[1 2 3] when small, rapid-cycle wellhead dehydration assemblies were developed. The use of activated silica gel in the small-bed and rapid-cycle dehydration unit produces significant recoveries of stable lease-tank hydrocarbon liquid.

Although the incidental hydrocarbon recovery of the rapid-cycle dehydrators can be commercially important in some installations, their hydrocarbon-recovery efficiency is limited.

The inherent differences between hydrocarbons and water in their adsorption and vapor-liquid equilibrium characteristics mean that a dry adsorption dehydrator may remove water vapor very efficiently but be relatively inefficient in the recovery of hydrocarbons. The development of an adsorption process to extract and recover primarily hydrocarbons, gasoline, and LPG fractions, with dehydration as an incidental operation, resulted in the successful testing about a year and a half ago of a packaged adsorption unit.[4] This new dry extraction process, Dryex adsorption, has been successfully tested in seven different commercial installations in the past year.

The process utilizes a high-temperature (600° F.) natural-gas stream to regenerate the adsorbent material, which is either activated silica gel or a combination of silica gel and activated charcoal. Relatively small beds of activated material are used so that the material may be quickly and uniformly heated to about 600° F. and then rapidly cooled to the adsorption temperature. Such an operation provides a relatively long operating life, about 1 year, for the adsorbent material.

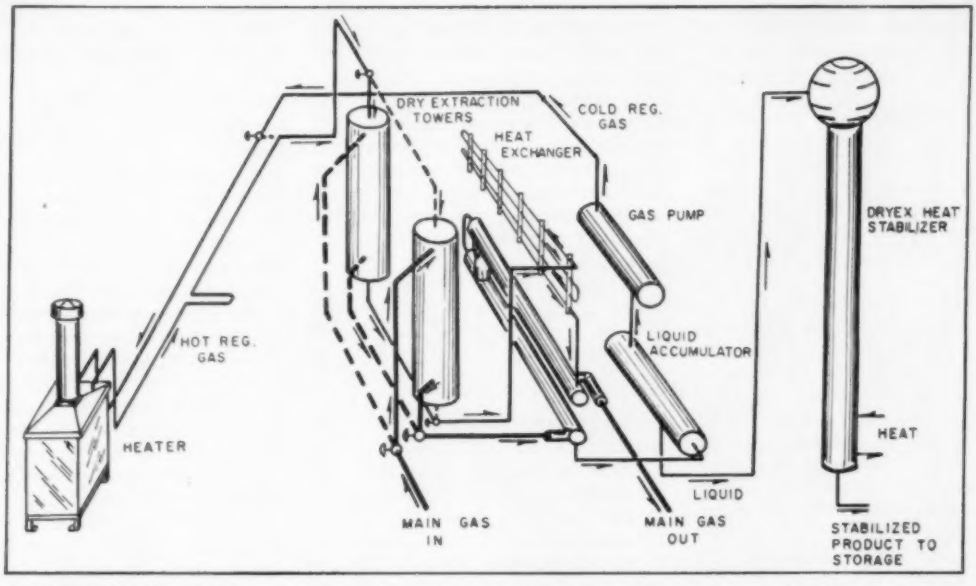
The use of small adsorbent beds and a rapid adsorption cycle means that the cost of a complete adsorbent change once per year is a relatively minor operating cost.

How it works . . . The basic process assembly is capable of recovering lighter hydrocarbons such as propane and butane, as well as the gasoline fractions. The gasoline-recovery unit has only two adsorption towers and uses silica gel as the adsorbing medium. The combination LPG and gasoline-recovery unit has a total of four adsorbing towers and uses both silica gel and activated carbon as the adsorbent.

The adsorption unit is fully automatic, self-contained, and skid mounted. No external cooling or heating mediums, such as water or steam, are needed. In some applications, for example in the processing of a small-volume and extremely rich gas stream, whereby the available volume of cooling gas is limited, it may be desirable to use external cooling water.

Utility requirements are minor. Fuel gas requirements are equivalent to about 8 cents per barrel of recovered product, while electric-power requirements to drive a gas pump are equivalent to about 7 cents per barrel of recovered product. The use of elec-

Author is with Parks & Dow Engineering Consultants, Houston. Paper presented at NGAA meeting, Casper, Wyo., 1958.



ADSORPTION-UNIT FLOW is simple and easily controlled. Unit is inexpensive to build and operate, and to maintain.

. . . for gasoline and LPG recovery from natural gas

BY W. M. DOW

tricity is optional as the regeneration gas pump can be gas driven by the main gas stream.

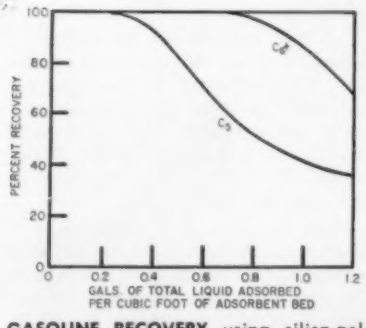
The control system has been designed and engineered to give safe and reliable automatic operation of an unattended unit.

Flow pattern . . . The vessel assembly consists of essentially two vertical adsorption towers, a heat exchanger, an extracted liquid accumulator vessel, a gas pump and motor, a direct-fired gas heater, plus the associated gas piping and valves. The gas flow controls consist of five three-way valves pneumatically operated by a self-switching automatic control system.

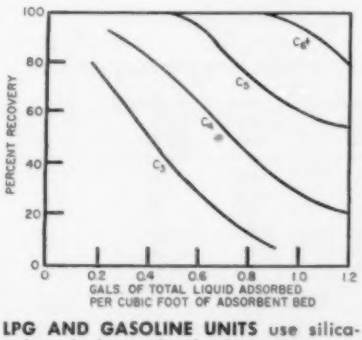
Two large three-way valves direct the flow of the main stream through one tower and then the other, while two small three-way valves direct the flow of the regeneration gas through the appropriate tower. The fifth three-way valve bypasses the regeneration flow around the heater during the cooling period of each cycle. The recovered hydrocarbon liquids are discharged into a heat-stabilization tower which produces stable lease-tank gasoline of any desired vapor pressure.

As shown in the schematic flow diagram, the main gas stream, which should be free of entrained liquid, flows down through an extraction tower, through the gas-to-gas heat exchanger, and then out of the unit. The regeneration gas stream is circulated continuously by a motor-driven gas pump through the heater, tower, heat exchanger, and liquid accumulator. The heater is bypassed during

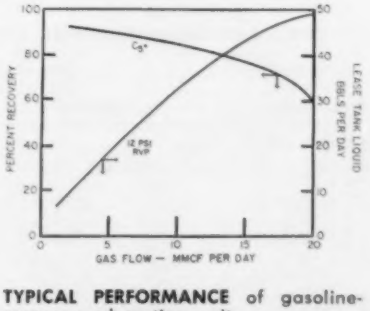
Dryex adsorption results



GASOLINE RECOVERY using silica-gel bed decreases as liquids are adsorbed.



LPG AND GASOLINE UNITS use silica-gel and charcoal adsorbents.



TYPICAL PERFORMANCE of gasoline-recovery adsorption unit.

the cooling period of each cycle. The three-way control valves determine which adsorption tower each gas stream will flow through. Normal operating cycles are 30 to 60 minutes.

Recovery efficiency . . . The adsorption efficiency for the extraction of gasoline and LPG fractions from a natural-gas stream is affected primarily by the adsorption temperature and, to a lesser degree, by the incoming gas composition and by static pressure.

The over-all recovery of any adsorption unit is not merely a function of the adsorption efficiency but is influenced greatly by the effectiveness of the condensation of the vaporized extracted hydrocarbons during the regeneration process. Efficiency of the condensation operation is very sensitive to numerous factors such as process flow design, heat-balance design, composition of the enriched regeneration stream, and condensation temperature and pressure.

The condensation operation is more difficult the leaner the incoming gas stream. The assembly can achieve +95% condensation of the adsorbed and vaporized gasoline fractions over a wide range of gas compositions and condensation temperatures and pressures. The condensation efficiencies for butanes and propane are somewhat less than those for the gasoline fractions.

Silica gel and activated charcoal are the two most practical and efficient adsorbent materials to use in the extraction unit. Activated charcoal has a slightly greater adsorption efficiency for gasoline components than silica gel and is much superior for the recovery of the lighter hydrocarbons such as propane and butanes. However, silica gel has certain operational and economic advantages and is capable of dehydrating the gas stream while it is extracting the hydrocarbon liquid products.

Silica gel is used as the adsorbent in the gasoline recovery unit, while both silica gel and activated charcoal are used in the combination LPG and gasoline-recovery unit.

The accompanying curves show the per cent recovery for each individual hydrocarbon component in the incoming gas stream as a function of the amount of total liquid adsorbed per cycle.

As might be expected, the greater the adsorbed load on the solid bed, the lower is the recovery efficiency. The recovery efficiencies represent actual dynamic performances of the Dryex adsorption unit and are not laboratory equilibrium adsorption conditions.

The recoveries are representative of typical gas pipeline conditions of about 80° F., about 800 psi., and about 0.20 pentanes-plus gal. per M.c.f. content.

Operating performance . . . The total recovery of the unit increases as the gas flow increases up to the maximum volumetric capacity of the unit, which, in this example, is slightly over 50 bbl. per day.

As the gas flow through the unit increases, there is a corresponding decrease in the efficiency of the recovery of the pentanes-plus fractions out of the incoming gas stream. In representative installations, the extraction of the pentanes-plus fractions will be within the range of 60 to 90%.

TABLE 2—ECONOMICS OF TYPICAL DRYEX INSTALLATION

Initial cost:	
Equipment	$112,000
Installation	15,000
Total	$127,000
Annual revenue: (95 bbl. per day)	$101,500
Annual expenses:	
Fuel and electricity	$ 4,500
Adsorbent	4,500
Maintenance and operation	9,500
Depreciation and overhead	10,000
Total	$ 28,500
Annual profit:	
Net before tax	*$ 73,000
Net after 52% tax	† 35,000
Payout before taxes: Total cost / Profit plus Depreciation Fund	= 1.6 years

*57% return; †28% return.

Table 1 lists the performances of some actual installations. Only gasoline-recovery-type units are included in Table 1. One unit, the fifth one listed, is processing a gas stream which has been compressed and has a relatively high temperature and high gallon per 1 M.c.f. content.

Another example, the second one listed, involves the processing of a gathered-gas stream which has already been processed through low-temperature separators. The relatively lean gas discharged from the low-temperature separators is further processed by a Dryex adsorption unit for an additional recovery of about 2 bbl. per M.M.c.f. The other examples listed in Table 1 cover the processing of various pipeline natural-gas streams which, in general, have been conditioned only by conventional separation upstream of the unit.

Economics . . . The economics of field processing of natural-gas streams by the Dryex adsorption process are very favorable. The cost of the adsorption processing assembly complete with controls, instruments, and granular adsorbent will vary from about $1,000 to $1,600 per barrel of daily recovery of raw gasoline for units sizes varying from about 40 to 200 bbl. per day recovery. Installation costs, including cost of auxiliary equipment such as separators and storage tanks, will vary depending upon the conditions of each installation but, in general, will be about 10 to 15% of the cost of the process assembly.

In addition to the relatively low initial cost per barrel of daily product recovery of the adsorption processing assembly, a major economic advantage of the unit is its exceptionally low operating cost and simplicity of operation. Direct operating costs for fuel gas and electricity for packaged adsorption units will amount to 15 cents or less per barrel of recovered product. If a pressure drop of about 25 psi. in the main gas stream can be tolerated, this operating utility cost may be cut in half by using a gas-powered blower rather than an electric-driven unit.

In most applications in producing fields, a gas-driven operation is not only permissible but is desirable, and eliminates the need for electricity. In many pipeline applications it is more desirable to provide for electric power rather than suffer a pressure drop in the main gas stream.

Table 2 gives the economics of a typical installation with a recovery capacity of 95 bbl. per day. This unit, for example, might be placed on any typical natural-gas stream of 10 to 40 M.M.c.f. per day with a pentanes-

TABLE 1—PERFORMANCES OF ACTUAL ADSORPTION INSTALLATIONS

Adsorption tower size (Dia. x height)	Gas flow M.M.c.f.p.d.	Inlet temp. °F.	Inlet pressure psi.	Recovery b.p.d. 12 psi. R.v.p.	Inlet gal. per M.c.f. pentanes+
48 in. x 15 ft.	25	84	1000	93	192
48 x 15	35	77	1000	68	.098*
36 x 10	7	75	580	33	.194
36 x 10	11	83	1000	44	.223
36 x 10	4	96	375	26	.313
36 x 15	13	72	650	36	.129
	6	72	650	19	.129

*Installation downstream of low-temperature separators.

plus content from about 0.40 to 0.10 gal. per M.c.f., respectively.

Adsorption in the Recovery Picture

The two conventional processes in commercial use today for recovering gasoline and LPG products from natural-gas streams are the oil-absorption process and the low-temperature refrigeration process. The well-established oil-absorption process is well suited for large central gasoline-plant installations with recovery capacities of several thousands of barrels per day of numerous liquid products. However, the economics of an oil-absorption process will not justify its use on small, relatively lean gas streams.

Low-temperature refrigeration plants have achieved some success in treating small isolated gas streams but only when the gas stream is unusually rich in heavier hydrocarbon fractions. Most natural-gas streams from presently produced gas wells contain only 0.100 to 0.300 gal. of pentanes-plus per M.c.f. of gas and such gas streams are much too lean for the commercially successful operation of a low-temperature refrigeration plant.

Relatively simple low-temperature separation units which can utilize the energy of high-pressure flowing gas wells in place of an auxiliary refrigeration source have found widespread use throughout the industry as an individual gas-well installation. However, only a minor portion of the total producing gas wells have high enough flowing pressures to justify the installation of a low-temperature separation unit.

Even though the low-temperature separation units do a commendable job of recovering additional condensate under the proper operating conditions, they still leave a large amount, 30 to 70% depending upon operating conditions, of the raw gasoline in the residue-gas stream and, of course, recover only very minor amounts of butanes and propane.

Small streams . . . The Dryex adsorption process has been developed primarily to fill the need in the natural-gas industry for an economic and efficient hydrocarbon-recovery unit to extract raw gasoline and LPG fractions from relatively small natural-gas streams which could not be economically processed by means of oil absorption or refrigeration. As such, the adsorption process can be best utilized as a field-processing tool to treat the gathered-gas production from a portion or from all of a producing field.

For small gas-producing fields the adsorption unit can best be installed at a central point to process the gathered gas prior to pipeline delivery. In larger gas-producing fields it might be desirable to have several central processing locations. In such field processing applications an installation will not only provide a very attractive economic return from the recovery of gasoline and LPG products but, of course, will also produce extremely dry and easily handled pipeline transmission gas.

Greater recovery . . . Over the producing life of a gas field, the stable lease tank recovery by means of a Dryex adsorption unit would be considerably greater than the corresponding recovery with low-temperature separation units, or even with an auxiliary refrigeration plant which could maintain a 10° F. separation temperature regardless of wellhead pressure. Table 3 shows the recovery preformance of various processing methods which might be used in producing a moderately rich gas-condenaste field.

Table 4 gives the same information for a very lean gas-condensate field. As can be seen from Tables 3 and 4, the average recovery over the producing life of a gas field is much greater with an adsorption unit than with low-temperature separation units.

On some high-pressure, extremely rich gas-condensate fields, a combination installation of low-temperature separators on each well and a central adsorption unit to process the gas is desirable. On leaner gas fields, simple separation at each well with a central Dryex processing unit would be the best producing and processing scheme.

The adsorption process can also be used very effectively to process large volumes of lean transmission pipeline gas.

TABLE 3—COMPARATIVE RECOVERIES OF VARIOUS PROCESSING METHODS IN THE PRODUCTION OF A MODERATELY RICH GAS-CONDENSATE FIELD

Reservoir pressure (psia.)	Lease-tank recovery, bbl. per M.M.c.f., by following processing methods (A) Dryex adsorption at 90° F. (gasoline recovery unit)	(B) Refrigeration plant 10° F. separation temperature	(C) Low-temperature separation unit	(D) Conventional separation at 90° F.
3,000	42.5	40.0	40.0	35.0
2,500	40.0	37.5	37.0	32.5
2,000	34.5	32.0	30.0	26.5
1,500	30.5	28.5	24.0	22.5
1,000 (pipeline pressure)	29.0	27.0	22.0	22.0
Average recovery for entire producing life	35.0	32.5	29.5	27.5
Value of additional production for 50 M.M.c.f. of gas reserves*	$1,070,000	$710,000	$285,000	(Basis for comparison)

*Accumulative value of additional liquid production greater than recovery by conventional separation over the entire producing life of 50 M.M.c.f. of gas reserves.

TABLE 4—COMPARATIVE RECOVERIES OF VARIOUS PROCESSING METHODS IN THE PRODUCTION OF A VERY LEAN GAS-CONDENSATE FIELD

Reservoir pressure (psia.)	Lease-tank recovery, bbl. per M.M.c.f., by following processing methods (A) Dryex adsorption at 90° F. (gasoline recovery unit)	(B) Refrigeration plant 10° F. separation temperature	(C) Low-temperature separation unit	(D) Conventional separation at 90° F.
2,500	5.80	4.80	4.60	2.20
2,000	4.75	3.75	2.50	1.25
1,500	4.10	3.05	1.05	0.80
1,000 (pipeline pressure)	3.90	2.85	0.50	0.50
Average recovery for entire producing life	4.50	3.40	2.00	1.10
Value of additional production for 50 M.M.c.f. of gas reserves*	$485,000	$327,000	$127,000	(Basis for comparison)

*Accumulative value of additional liquid production greater than recovery by conventional separation over the entire producing life of 50 M.M.c.f. of gas reserves.

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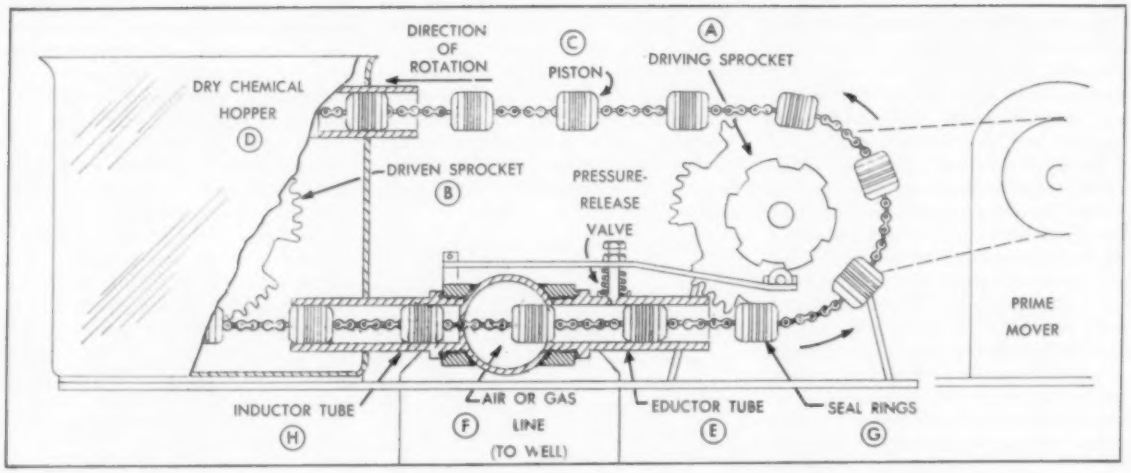


SOLIDS PUMP is used to inject antiballing agent in high-pressure gas lines.

Stearates, foaming agents combat water in air or gas drilling

Pan American experiments result in definitive conclusions

IT IS GENERALLY AGREED that the water-encroachment problem must be overcome to put air and gas drilling on a reliable and economic basis.

Water flow into a well bore from the formation occurs because there is no head of mud in the annulus. Any water influx will wet bit cuttings and the wet cuttings often become "sticky," forming rings or balls on the drill collars and drill pipe. This causes a restriction of flow which compresses the gas, further decreasing its lifting capacity. The final result can be loss of returns and possibly stuck pipe.

The ideal solution to the problem of water influx would be to seal off the water-bearing formation if this procedure is not too expensive. Some satisfactory water shutoffs have been made by plastic squeezes. In many air or gas-drilling operations, however, sealing may be uneconomical.

The alternative is to continue to drill with air or gas and combat the harmful effects of the water inflow with techniques which permit continuous circulation and removal of bit cuttings.

Use of methods which will allow

This paper was presented at eighteenth annual meeting of the American Association of Oilwell Drilling Contractors, Dallas, October 3, 1958.

THE BIGGEST PROBLEM in air or gas drilling is controlling influx of water into the well bore. After many lab and field tests, Pan American Petroleum Corp. has reached these conclusions:

1. The addition of stearates of zinc and calcium to an air or gas stream effectively prevents agglomeration of bit cuttings when water production ranges from trace amounts to approximately 2 bbl. per hour.

2. In addition to the antiballing qualities of the stearates, these materials effectively reduce friction between drill pipe and the walls of a hole while drilling with air or gas.

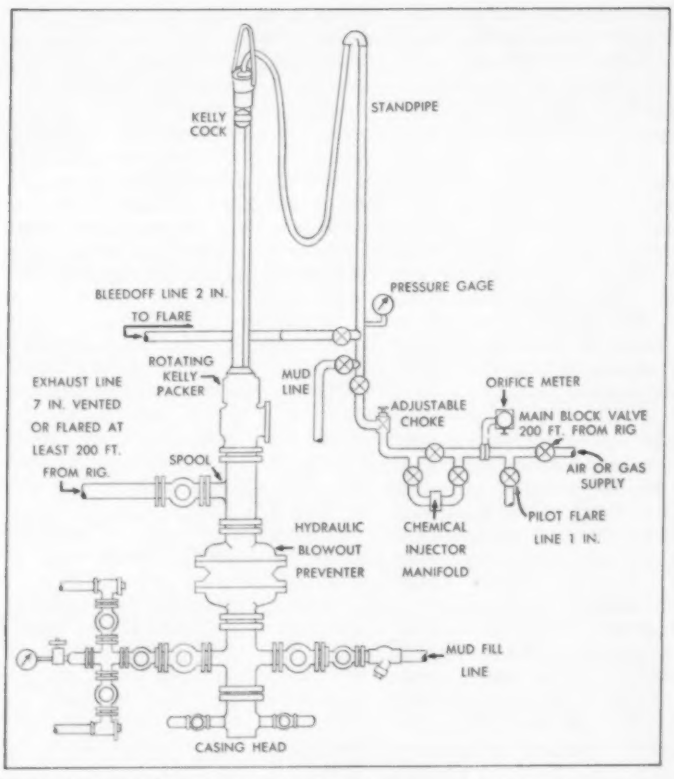
3. A solids pump was developed which is satisfactory for injecting stearates or other finely ground materials into an air or gas stream against pressures as high as 750 psi.

4. A nonionic foaming agent (Synfoam No. 1) is an effective means of removing intermediate quantities of water (from 2 to about 60 bbl. per hour) from a well bore.

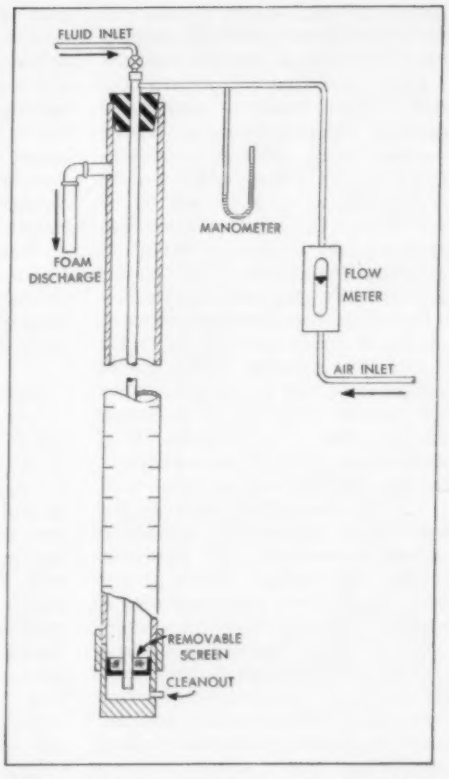
5. Use of a foaming agent for removing water in several wells made it possible to continue air or gas drilling, resulting in faster drilling rates than would have been obtained using conventional drilling mud.

6. Formations producing small or intermediate quantities of water can be successfully penetrated by using stearates or foaming agents or a combination of the two methods.

BY B. V. RANDALL, J. L. LUMMUS, AND R. P. VINCENT
Pan American Petroleum Corp.



PIPING PROGRAM for field testing foaming agents includes flow meter, chemical feed pump and gas-driven water pump.



MODEL WELL was used to test potential foaming agents in the laboratory.

air or gas drilling to proceed at an economical rate through water producing zones would allow perhaps 10 to 20% or more of the total well footage in the United States to be drilled with air or gas.

The problem of water inflow may be divided into three broad categories: (1) small quantities in so-called "weeping" formations, (2) intermediate quantities which might be economically removed with air or gas if lift efficiency could be improved, and (3) excessive quantities which, from a practical and economical standpoint, generally dictate conversion to conventional mud drilling.

Combating Small Quantities

Experiments showed that if the volume of water present is between 10 and 35% of the weight of cuttings, the cuttings tend to become "sticky" and subsequently may form mud rings on the drill string. This may result in sticking of the pipe. For example, shale cuttings show a tendency to become "sticky" in the presence of approximately 10% by weight of water. This could be caused by a small amount of water production in the hole or simply by water condensed from the input air.

The rate of water production which causes "balling" of cuttings cannot be precisely defined. This rate is influenced by the vapor capacity of the circulating gas, and the type, amount, and particle size distribution of the bit cuttings. But, in general, the maximum flow rate for "balling" conditions is less than 2 bbl. per hour.

How lab tests were made . . . Laboratory tests were made to find the best way of preventing agglomeration of cuttings in the presence of water. Various materials were tested. Some had good water-adsorbing characteristics; others were known to impart a water-repellent film on surfaces.

In the test for effectiveness of a material in preventing agglomeration of cuttings, 50 g. of a low-yield clay or pulverized cuttings were placed in pint Mason jars. From 1 to 10% by weight of the materials being tested was added. Then, the jar got a violent shaking with intermittent additions of water until the clay or cuttings began to agglomerate.

The most effective materials were those which permitted the least agglomeration.

How field tests were made . . . Shallow wells were drilled with air into a known water-sensitive shale formation which lay beneath a water-producing sand. While drilling the shale zone, the materials found effective by the test described above were injected into the air stream. This showed the effectiveness of the various materials in preventing "balling" of cuttings and subsequent formation of mud rings. Solid materials were injected with the laboratory designed solids injector which is described in Appendix A.

Wells being drilled with air or gas in which small quantities of water were expected to cause trouble were chosen for field testing antiballing agents. The materials found most effective in laboratory tests were added to the air or gas stream with the solids injector (except in one case when it was not available) and the torque, penetration rate, circulating pressure, and condition of cuttings were noted where possible.

Results of tests . . . The tests showed that agents which absorb water are not effective in preventing "balling" of cuttings. However, organic liquids such as kerosine or diesel oil, or water-repellent powders such as oil-soluble resins or heavy metal soaps prevent "balling" of cuttings in the presence of water. Shallow well-drilling tests confirmed that kerosine and other organic fluids form films on the drill pipe, wall of the hole, and cuttings which effectively repel water.

However, if there is the slightest excess of the organic fluid, the cuttings tend to ball into a puttylike mass.

Special grades of zinc and calcium stearate were found to impart the necessary water repellency to the cuttings and other surfaces. These materials have no adverse effect on the cuttings if used in excess and do not contribute to the fire hazard. They are also good lubricants, nontoxic and relatively inexpensive. They do not interfere with geological analyses.

Fig. 1 shows a new type of solids injector designed especially for pumping stearates or other finely ground powders into an air or gas stream. No suitable commercial equipment was available for this purpose. Fig. 2 shows where the injector was placed during drilling.

Table 1 shows field tests on five wells where either zinc or calcium stearate was used for preventing "balling" of cuttings. Water production ranged from trace amounts to approximately 2 bbl. per hour. Appendix A gives more detailed description of these field tests. Table 2 shows the quantity of zinc or calcium stearate which field experience has indicated is required to prevent "balling" of cuttings under various hole-size conditions and degrees of dampness.

The field test on Well 5, Logan County, Arkansas, (Appendix A) showed that calcium stearate is also an effective lubricant. When this material was injected into the hole at one point torque was cut by 15% and the drag required to get off bottom was cut by 30%.

The Chemicals

Materials which other operators had found unsatisfactory for drying up well bores were also tested in the laboratory, and reasons for their failure was studied. It was found that solvents or adsorbents which do not impart a water-repellent film on surfaces would remove small quantities of water from wells but generally hard-balled material was left behind.

Zinc stearate cannot be used at temperatures above 250° F., but it was used in the initial field tests because it was readily available in the special grade required. A satisfactory calcium stearate is now readily available and has the advantage of a higher melting point (300° F.). Recently, a grade of lithium stearate with a melting point of approximately 390° F. has proven an effective antiballing agent.

Laboratory and shallow well tests showed that the presence of a small amount of water causes bit cuttings to become "sticky" and form mud rings on the drill pipe. Field tests confirm this. When such a condition develops, the pressure required to circulate increases. Often, if the condition is severe, circulation may be completely stopped.

Well 4 in Eddy County, New Mexico, clearly showed the effectiveness of stearates in preventing balling of cuttings in the presence of small quantities of water. When this condition occurred, 30 lb. of calcium stearate were injected into a gas stream with the new solids injector. Circulation was possible again almost immediately after starting injection. Continued injection prevented further difficulty. This same test demonstrated that the presence of small quantities of oil in the hole does not affect the antiballing property of calcium stearate.

How much to add . . . Experience shows that zinc or calcium stearate should be added at a rate of from 1 to 4% of the weight of the cuttings. The solids injector adds 0.12 lb. of stearate per revolution of the drive sprocket. For example, if a 8¾-in. hole is being drilled and only a trace amount of water is being produced, Table 2 shows that the sprocket of the injector should be turned five revolutions per foot of hole drilled. This injects 0.6 lb. of stearate which will effectively coat 60 lb. of cuttings from 1 ft. of 8¾-in. hole. If the drilling rate is 0.5 ft. per minute, 18 lb. of stearate would be injected over 1 hour.

A water-bearing formation is sometimes depleted by continuously blowing air or gas through the hole. There is evidence that the stearates may aid this drying process by coating the walls of the formation. Under these conditions, it is not necessary to continuously inject stearate. A field test on Well 3, Val Verde County, Texas, showed that a dry hole can be maintained by injecting stearate prior to trips and deviation surveys.

Stearates effectively waterproofed cuttings and caused the hole to "dust" on at least four field tests of stearates. Where it was not proven that the antiballing agent was necessary to continue drilling, it still saved time normally used to circulate to dry the hole.

How much water . . . Both laboratory and field tests show it is difficult to measure small quantities of water flowing into a well bore while drilling with air or gas. However, our tests, and information from other operators and air-drilling-service companies indicate that "balling" of cuttings occur when water inflow is less than 2 bbl. per hour. More than 2 bbl. of water per hour forms a slurry of mud in the hole rather than causing "balling" of cuttings. As evidence of this, some operators have partially overcome "balling" of cuttings by injecting additional water in the hole. When water inflow is more than 2 bbl. per hour, injection of larger quantities of stearate than those shown in Table 2 has some beneficial waterproofing action. But, the hole does not dry up because of the excess water.

Intermediate Quantities of Water

When water influx is more than about 2 bbl. per hour, the method discussed above becomes impractical. Water and cuttings must be removed by an alternate method. If sufficient air or gas is available at high enough pressure, water and cuttings can be blown out of the well bore. However, this gas-lift design is anything but ideal; its efficiency might be as low as 5%. This low efficiency is further complicated by the friction losses in

TABLE 2—AMOUNT OF CALCIUM STEARATE REQUIRED TO PREVENT BALLING OF CUTTINGS

Hole size (in.)	Approx. weight (lb.) of cuttings per ft.	Pounds of calcium stearate per foot of hole drilled		
		Water influx: trace	0.5-1 BWPH	1-2 BWPH
5⅝	25	0.3	0.5	1
6¾	36	0.4	0.8	1.5
7⅞	49	0.5	1	2
8¾	60	0.6	1.2	2.4
9⅝	73	0.7	1.5	2.9
11	95	1	1.9	3.8
12¼	118	1.2	2.4	4.7
13¾	148	1.5	3.0	5.9
17½	240	2.4	4.8	9.6
22	380	3.8	7.6	15.2

Each revolution of the solids injector sprocket injects 0.12 lb. of calcium stearate.

TABLE 1—RESULTS OF FIELD TESTS OF ANTIBALLING AGENTS

Test No.	Area—	Depths (ft.)	Results
1.	Andrews County, Texas	2,347	Regained cuttings return. Cuttings partially waterproofed.
2.	San Juan County, Utah	2,153-2,442	Regained cuttings return. Cuttings water repellent.
3.	Val Verde County, Texas	5,175-7,800	Cuttings water repellent. Torque and vibration reduced.
4.	Eddy County, New Mexico	884-914	Hole dried.
		3,700-3,820	Regained cuttings return. Small oil flow overcome.
5.	Logan County, Arkansas	8,935-8,974	Torque and drag reduced.

a long string of pipe and a rough annular space. Thus, it is economically impractical to lift water from any but the most shallow holes by this method.

Use of an ideal foaming agent would enable air or gas to remove water and cuttings from a well bore effectively. Moreover, such a material would lubricate the cuttings to prevent "balling," and would prevent the formation of destructive high-speed slugs of water.

Making lab tests . . . Laboratory tests determined the static and dynamic surface tensions, film thicknesses, and film-drainage rates by using dilute aqueous solutions of various foaming agents. Potential foaming agents were tested in a model well. Solutions to be evaluated were placed in the well and air introduced at a known rate. The rate of foam rise, the volume of foam produced, the weight of cuttings carried out, and the volume of liquid carried out were measured. These results were used to calculate water-carrying capacity, cuttings-carrying capacity, foam-producing ability and stability under various rates of shear.

Materials were evaluated in the presence of many types of cuttings, various brines, oils, and other possible contaminants. Additional tests were made in an 800-ft. cased hole under various operating conditions including back-pressure-simulating conditions down to 18,000 ft. Actual drilling tests were also made in both limestone and water-sensitive shale formations.

Field tests of foaming agents were made in wells being drilled with air or gas where water flows were expected to exceed 2 bbl. per hour. Where possible, a flowmeter, a chemical feed pump, and a gas-driven water pump were connected to the high-pressure air or gas supply line. When water was encountered in the well bore a foaming agent and additional water were injected at various rates and the quantities of fluid flowing out the exhaust line as well as the effects on circulating pressure and drilling conditions were observed.

What lab tests showed . . . Laboratory model well tests indicated that an excellent foaming agent is one which reduces the surface tension to about 40% of its original value. The tests also indicated that the surface tension of the foaming agent can be too low; one experimental agent which reduced the surface tension to approximately 30%, produced such weak films that a stable foam could not be made.

Tests were also made to determine the effectiveness of various surfactants as possible foaming agents for use in air or gas drilling. One surfactant, Synfoam No. 1, was found superior to any foaming agent tested for removing fresh water, or brines containing up to 5% salt and cuttings. In model wells and in the 800-ft., 10-in. cased hole, this agent would lift water and cuttings in the presence of all types of contaminants except an excessive amount of salt. This material appeared effective under conditions simulating an 18,000-ft. well, at air or gas velocities ranging from 2 ft. per minute to 7,000 ft. per minute.

Subsequent laboratory work developed a modification of Synfoam No. 1 which is effective in all types of brines, as well as in the presence of any common contaminants. This material has been designated as Synfoam No. 2.

Further tests showed that both materials become increasingly effective relative to other foaming agents in the presence of high concentration of pulverized cuttings, particularly clays or shales. They may be used with either lime or organic corrosion inhibitors.

What field tests showed . . . The results of field tests of Synfoam No. 1 on five wells are shown in Table 3: Details of these tests are described in Appendix B. The tests show that the foaming agent will effectively remove intermediate quantities (from 2 to 60 bbl. per hour) of water while drilling with air or gas.

Synfoam No. 1 was found to be more effective than a number of other foaming agents in brines containing up to 5% salt and in waters containing calcium sulfate. In instances where the volume of air or gas was not sufficient to circulate water and cuttings from wells, addition of Synfoam No. 1 was effective in regaining circulation. In the field test on Well 2, Eddy County, New Mexico, the new foaming agent and water were used to lift bit cuttings because the quantity of gas available was too low for removing cuttings.

Field tests on Well 1, Rio Arriba County, New Mexico, and on Well 3, Lea County, New Mexico, indicated that Synfoam No. 1 could be used to maintain gas drilling at an economical rate. Without foam it would have been impossible to drill without converting to conventional drilling mud. No field tests have as yet been made of Synfoam No. 2.

Nonionics look best . . . The agents listed in the literature as the best foamers are generally anionic. Some of these, excellent foamers for shampoo or dishwashing, are completely destroyed under well conditions. Anionics with satisfactory foam stability are adversely affected by brine or hard water. Although cationic surface active agents are tolerant of brines, they are very strongly adsorbed on bit cuttings and can become completely inactive in the presence of pulverized solids. Nonionic agents, of which Synfoam No. 1 is an example, are less strongly adsorbed on cuttings. They are not as sensitive as anionic agents to contaminants such as sodium chloride and calcium sulfate.

Upper limit—60 bbl. per hour . . . Our field tests and information from other operators and service companies indicates that foam drilling can be economical if water production does not exceed approximately 60 bbl. per hour. This upper limit that can be effectively removed with foam is an arbitrary one. But it has proved useful in determining whether to continue air or gas drilling or convert to conventional drilling mud.

Case histories support this approximate upper limit. For example, in the field test on Well 4, Eddy County, New Mexico, the surface and intermediate hole was drilled without difficulty using additions of Synfoam No. 1 and water to remove damp cuttings and a small amount of water from the hole. However, there was a water influx estimated to be 250 bbl. per hour below the intermediate casing point. This amount could not be efficiently removed with the limited quantity of air available. Additional compressor capacity and foaming agent to remove this quantity of water would have been prohibitively expensive.

In Well 3, Lea County, New Mexico, Synfoam No. 1 was used to remove approximately 15 bbl. of saturated brine and 1 bbl. of oil per hour while drilling from 6,200 to 8,038 ft. This section required 169 rotating hours and 16 bits, compared to 275 rotating hours and 20 bits for a nearby well drilled with mud. Savings in rig time and bits over the interval studied were approximately $10,000.

How to use chemical . . . Synfoam No. 1 is generally mixed in 10 bbl. of water and pumped into the air or gas line on the high-pressure side. The quantity of foaming agent in the water varies depending on the quantity and salt content of the water being produced. Table 4 shows, for example, that in order to efficiently remove 20 bbl. per hour of fresh

water, would require 4 lb. per hour of foaming agent. Eight pounds per hour would be required if this quantity of produced water contained approximately 8% salt.

It is often hard to decide whether to apply stearate for combating small quantities of water or to use foaming agents for intermediate quantities. That is, both methods have been used in several wells when water was being produced at 3 to 4 bbl. per hour, or just above the effective range of the stearates. The following procedure aids in selecting which of these methods to use.

Bore-hole dampness is often first indicated by reduction but not cessation of dust or by an increase in water-vapor content of flowing gas, or by restriction indicated in the well bore (increase in pressure, increase in torque, or drag on drill collars and bit). In such cases, antiballing-agent injection should be started immediately. The agent can be detected in the exhaust by water repellency of the cuttings or appearance of a white dust. As soon as it is detected drilling may continue without attempting to blow the hole dry.

Water seepage into the well may cause balling and mud rings before the antiballing agent is injected. If so, the hole may be cleaned by 5 to 10 bbl. of water containing 1 to 4 lb. of the new foaming agent. This mix is added down the drill pipe and foams out the obstruction. After this treatment, the hole may be drilled "dry" by using antiballing agent to prevent cuttings from sticking to the damp portions of the hole. Or, additional water and foaming agent can be injected as required to clean out the well bore. "Dry" drilling generally results in faster penetration rates.

When an intermediate quantity of water is encountered, the dust flow stops suddenly. There also may be a "drilling break" and an increase in circulating pressure. About 5 lb. of foaming agent with 1 to 5 bbl. of water should be added. As soon as circulation is established, drilling may resume while water flow rate is determined. Foaming agent and water should be added in the smallest quantities which produce constant circulation and a low, even, circulation pressure. This will result in maximum penetration rate at minimum chemical cost.

For instance, where sloughing of shale formations is not a problem, consider use of the foaming agent for removing both small and intermediate quantities of water. However, the faster drilling rates under dry conditions is a strong point in favor of using stearates for combating small quantities of water, whether or not shale sloughing is a problem.

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APPENDIX A

Well 1, Andrews County, Texas . . . While drilling intermediate hole at 2,167 ft., a small water flow caused the bit cuttings to become damp. By use of a booster compressor, circulating long periods of time, and frequent pipe movements, drilling was continued to 2,347 ft., where circulation was lost. Bit cuttings were moist redbed clays and no free water was found with a bailer. No solids injector was available; therefore, an attempt was made to put a special grade of zinc stearate into the air supply with a sandblasting machine. When this device failed, small quantities were added to the drill-pipe connection and to a pair of lubricators.

A small flow of cuttings was circulated out of the exhaust line. Although the cuttings were water resistant, tests showed that additional zinc stearate (approximately 1% of the cuttings by weight) would be required to prevent balling.

TABLE 4—AMOUNT OF SYNFOAM NO. 1 RECOMMENDED TO REMOVE WATER AND CUTTINGS

	Synfoam No. 1 recommended, lb./hour			
	Fresh water			Saturated brine or oil present
Water produced, bbl./hour	Less than 1% brine	5% brine	13% brine	
10 or less	2	3	7	14
20	4	6	14	28
30	6	9	21	42
40	8	12	28	56
60	12	18	42	84
80	16	24	56	112
100	20	30	70	140

TABLE 3—RESULTS OF NEW MEXICO FIELD TESTS OF FOAMING AGENTS

Test No.	Area—	Depths (ft.)	Results
1.	Rio Arriba County	4,958-5,984	Removed mud rings. Maintained full cuttings return. Penetration rate equal to dry section of hole.
2.	Eddy County	645-884	Removed cuttings at gas velocity at 900 ft. per minute.
		3,820-3,914	Removed cuttings and up to 30 bbl. oil per hour.
3.	Lea County	6,200-8,038	Removed cuttings and 15 bbl. of brine and 1 bbl. of oil per hour.
4.	Eddy County	95	Removed rings. Regained air and cuttings circulation.
		2,122	Removed 90 bbl. of water per hour.
5.	San Juan County	4,230-4,865	Removed rings. Cleaned out workover well.

Well 2, San Juan County, Utah . . . Damp hole conditions balled the bit cuttings while reaming a 6¾-in. hole to 9 in. at 2,085 ft. The hole was reamed to 2,153 ft. without returns. Using the solids injector, zinc stearate was injected for 4 hours at an average rate of 20 lb. per hour. Water-repellent cuttings returned and 84 ft. of hole were reamed during this period. During the next 18 hours a total of 100 lb. of zinc stearate was added intermittently while reaming an additional 205 ft. There was no further difficulty with balling of cuttings.

Well 3, Val Verde County, Texas . . . While air drilling an 8¾-in. hole, a water flow of approximately 0.3 bbl. per hour was encountered at 5,175 ft. Circulation of 2,700 cu. ft. per minute of dry air prevented accumulation of enough water to dampen cuttings except during shutdown periods. A special grade of calcium stearate (used in preference to zinc stearate because of a higher melting point) was tried. It was injected into the hole approximately 1 hour before trips, prior to deviation surveys, during reaming operations, and after trips until the hole became dry. Twenty pounds of calcium stearate per hour was sufficient to prevent sticking of damp cuttings. The calcium stearate was used intermittently in this manner for almost 2 months. During this test, torque and vibration were reduced whenever antiballing agent was injected.

Well 4, Eddy County, New Mexico After drilling a cement plug, a 13¾-in. hole was drilled to 884 ft. with foam. The hole was unloaded completely but remained damp and cuttings did not return to the surface. Calcium stearate was injected into the gas stream at the rate of 40

lb. per hour for 45 minutes. Nine minutes after initial injection, damp but nonballing cuttings coated with the powder came out of the hole. After 30 minutes, the cuttings circulated from the hole were dry. And, after 45 minutes, addition of calcium stearate was discontinued.

At 3,700 ft., a small amount of fluid began entering the well bore. This decreased, but did not completely stop, the circulation of dust and cuttings. Calcium stearate was injected at a rate of 18 lb. per hour and a full return of cuttings was obtained.

The cuttings contained small amounts of both oil and water; the powdered agent appeared to thicken the oil sufficiently to cause the cuttings to remain dry and not ball up. This treatment was used successfully for 10 hours to a depth of 3,820 ft. At this point an oil sand was penetrated and return of cuttings stopped.

Well 5, Logan County, Arkansas . . . While air drilling at a depth of 8,935 ft., the pull required to get the bit off bottom was 35,000 lb. more than the weight of the drill string. The torque indicator read 210. Fifty pounds of calcium stearate were injected over a 3-hour period. The drag on the bit was reduced to 23,000 lb. and the torque was reduced to 180.

During coring at 8,960 ft., torque registered 220 before injection of calcium stearate. After injection of 70 lb. the torque dropped to 170. The drag was not checked while coring, but at the completion of cutting the core it was only 20,000 lb.

APPENDIX B

Well 1, Rio Arriba County, New Mexico . . . In this well a 6¾-in. hole was being drilled with approximately 1,500 cu. ft. per minute of natural gas as the circulating fluid. At 4,917 ft., a small water flow caused the flow of dust to stop. Normal practice of blowing the hole dry and drilling ahead was used for 11½ hours to drill to 4,958 ft. At this depth mud rings in the hole caused excessive drag on the pipe and reduced the gas flow.

When it was apparent that normal gas drilling could not continue, 4 lb. of Synfoam No. 1 in 10 bbl. of water were injected. This treatment removed the mud rings and wet cuttings which had accumulated in the hole. The average treatment required to maintain a consistent foam while drilling was approximately 1.4 lb. of foaming agent in 7 bbl. of water per hour.

This treatment was used to drill from 4,958 to 5,984 ft. in 28½ hours of drilling time. One trip was made during this interval and the hole found to be open and free of cuttings. Because of mechanical difficulties, total time to drill the 1,026 ft. with foam was 55 hours.

During preparations to make a trip from 5,984 ft. the Mancos shale sloughed and stuck the pipe. Drilling mud was pumped into the well in the process of freeing the drill string.

This test showed that foam can be used to remove wet cuttings while drilling, and that penetration rates were similar to those with dry gas. However, shale which sloughs when penetrated with clear water should not be exposed to foam.

Well 2, Eddy County, New Mexico . . . Sixteen-inch surface casing was set at a depth of 785 ft. No top plug was used in displacing the cement and wet unconsolidated cement was found at 645 ft. From 1,025 to 1,840 cu. ft. per minute of gas was used to drill a 13¾-in. hole. Fifteen pounds per hour of the foaming agent was injected while drilling to 800 ft. About 20 bbl. of water as well as Synfoam No. 1 was required to drill to 884 ft. At this depth, additional gas was obtained and the hole was dried up using calcium stearate as an antiballing agent as described in Appendix A, Well 4.

At 3,820 ft. an oil sand was penetrated. Only partial returns could be obtained with as much as 50 lb. Synfoam No. 1 and 20 bbl. of water per hour. Drilling was continued to 3,914 ft. At this point it was estimated that about 30 bbl. per hour of low-gravity oil was being produced. An emulsion of brine and oil was blown out of the hole for 14 hours by additions of 10 lb. of Synfoam No. 1, 40 lb. of a salt water foaming agent and 20 bbl. of water per hour. If any one of these materials was not added, flow of the crude-oil emulsion from the well ceased within 5 minutes. It was apparent that the oil flow could not be economically overcome; so the system was converted to a conventional water-base mud.

This test indicated that foam can be used to remove cuttings when air or gas velocities are too low for normal air or gas drilling. Also, it is effective for removing small quantities of produced oil.

Well 3, Lea County, New Mexico . . . Gas was being used to drill a 9⅝-in. hole when water was encountered at a depth of 6,200 ft. Additions of Synfoam No. 1 allowed gas drilling to continue, and the well was drilled to 8,038 ft. in 16 days. The average well production was 15 bbl. of brine and 1 bbl. of oil per hour.

The water appeared to come from zones above 7,500 ft. Therefore, an attempt was made to keep the bottom of the hole dry by using a salt-water foaming agent in flake form to foam the water above the water-bearing zones. This procedure was unsatisfactory because the bottom of the hole could not be kept dry.

The most economical treatment to keep the hole free of cuttings was found to be 2 lb. of Synfoam No. 1, 1 lb. of Kembreak, ¼ lb. of caustic soda, and 10 bbl. of water per hour. The results indicate that Kembreak and caustic soda additions stabilize foam produced by Synfoam No. 1 when the produced water contains salts such as sodium chloride, calcium chloride, and calcium sulfate.

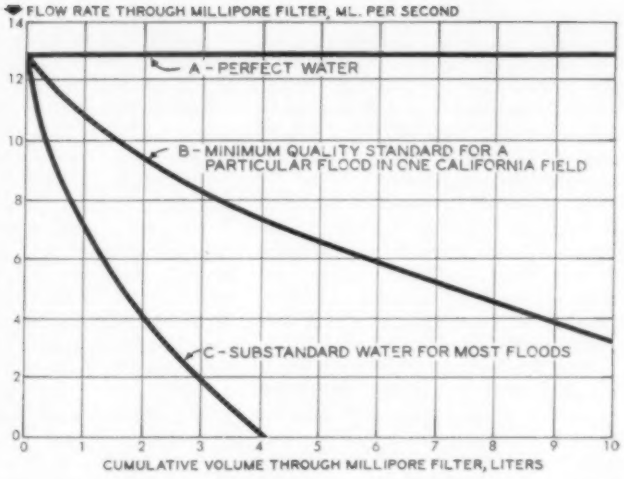
At 8,038 ft., gas supply decreased greatly and forced gas drilling to be abandoned.

Well 4, Eddy County, New Mexico . . . The 11-in. surface hole was air drilled below 38 ft. of 13⅜-in. conductor pipe. At a depth of 65 ft. damp hole conditions decreased the return of cuttings. At 95 ft. the return air contained no cuttings and had 100% humidity. When the pipe was picked up, it struck at a depth of 75 ft. and air circulation was lost. Approximately 20 bbl. of water and 4 lb. of Synfoam No. 1 were added to the air line during a 30-minute period while the bit was slowly lowered back to bottom. Thick foam, mud cake and mud balls were circulated out of the hole. The hole was clean and was drilled to casing point without difficulty.

When the drill pipe was pulled up, a mud ring was encountered at 95 ft. One-half barrel of water and 0.1 lb. of Synfoam No. 1 were injected into the air stream. This effectively cleaned the hole.

While air drilling at 2,122 ft., a water flow estimated at 250 bbl. per hour was drilled. This was more than the air available could handle. However, it was found that 90 bbl. per hour of water in the form of smooth, wet foam could be lifted from 1,130 ft. with 1,200 cu. ft. per minute of air and 16 lb. per hour of Synfoam No. 1.

Well 5, San Juan County, New Mexico . . . Approximately 800 ft. of open hole was being cleaned out with gas as a circulating fluid. This was interrupted by formation of mud rings in the casing. Four pounds of Synfoam No. 1 and 10 bbl. of water were injected; a large quantity of distillate, damp shale, and water came out of the exhaust line. The well dried out and began to dust within a few minutes and was redrilled without further difficulty.


FLOW RATE THROUGH MILLIPORE FILTER, ML. PER SECOND
14
12
10
8
6
4
2
0
A - PERFECT WATER
B - MINIMUM QUALITY STANDARD FOR A PARTICULAR FLOOD IN ONE CALIFORNIA FIELD
C - SUBSTANDARD WATER FOR MOST FLOODS
0 1 2 3 4 5 6 7 8 9 10
CUMULATIVE VOLUME THROUGH MILLIPORE FILTER, LITERS

FILTER DATA being recorded by Jesse Krider, Shell mechanical engineer at new filter plant in Dominguez field. Sampling tap just downstream of the pressure-leaf-type filter permits test to be quickly made. The chart shows the type curves which result from plotting data obtained by filter tests.

Filter test gives data on quality of flood waters

BY PASSING a small quantity of the injection water through a membrane or "molecular" filter, the water's plugging tendency is determined. The test also facilitates identification of the solids responsible for the plugging. Where filtration is carried out in pressure-leaf filters and diatomaceous earth used, as is the case in almost all California floods, the test can show the existence of filter-screen failures and other treating-system malfunctions.

The test is a modification of the Cerini test, commonly used for determining a flood water's plugging tendencies.[1] Through using a more-convenient filtering medium, more specific information on the nature of the plugging materials can be obtained.

Filter characteristics . . . The basic filter, commonly called the millipore filter, is a 0.005-in. thick cellulose ester disk. Its screen-like structure results in a porosity in the order of 80 to 85%. But because of the submicron size of the pores, solid particles as small as 0.4 μ and smaller are retained on the filter.

A significant feature of the membrane is that no ash results when the 47-mm. disk is burned. Accurate chemical analysis of the solids contained in a given volume of water thus can be made.

BY D. H. STORMONT
West Coast Editor

Another useful property is the uniform index of refraction. Immersion of a membrane in a clear liquid which has the same refractive index (1.49 to 1.51) allows trapped solids to be inspected by usual microscopic methods.

Field application . . . In some cases the test is carried out in the laboratory, using conventional vacuum filtering equipment into which the membrane-filter holder is fitted. Shell Oil Co., which makes extensive use of the test, usually carries it out at the filter plant.

A sampling tap is provided in the clean-water line just downstream of the filter. All that is necessary is to connect a plastic hose to the outlet and allow about 10 l. of water to flow through the filter as illustrated. The upstream pressure is held constant during the run. The plugging tendency of the flood water then is determined through plotting the flow rate versus the cumulative volume through the filter.

A perfectly clean water would result in a straight line, since there would be no reduction in flow rate as a result of filter plugging. Such a curve as A is sometimes achieved in the field. Curve B is the minimum quality standard for a particular flood in one California field. Curve C shows a water which would quickly cause plugging in almost any California flood.

Such plots are used by Shell at all its California floods. At the beginning of a project, samples are taken several times daily. After consistently good water is attained, tests are run only daily or weekly.

The plots offer a rapid, accurate check on the quality of the water. They also can be used as a check on the condition of the filtering equipment. At one California flood, presence of diatomaceous earth in the filtered water led to the discovery of a leak in the filter. In another case a bad batch of precoat material was discovered. In both instances it was possible to take corrective measures before injectivity of the input wells was damaged.

The method offers a quite useful tool for checking on bacteria. Most organisms present in the water are filtered out on the membrane. This can then be placed in a culture tube. If no growth occurs it can be concluded that the chemical treatment being followed is adequate. If it is not, and bacteria such as the hard-to-kill sulfate reducers thrive under culture, then another bactericide can be tried.

Reference

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BY W. L. NELSON
Technical Editor and
Petroleum Consultant

Heat required for distillation-type process unit

IF A CONVENTIONAL amount of heat exchange is practiced, the incoming feed will be heated by exchangers to a temperature approximately 50° to 150° F. below the temperature of the bottom or hottest outgoing product. As an example, the reduced crude from a topping unit is often at about 580° F., and crude oil is heated to 430° to 480° F. by heat exchange. In general, the approach to the bottom temperature by the feed is largest in the high-temperature operations (topping, cracking, etc.) whereas the approach is closer (50°-100° F.) in the lower-temperature operations, even 30° to 75° F. in hydrocarbon fractionation systems.

Likewise, the temperature of the hot or bottom product is seldom more than 100° F. lower than the vaporizer temperature in distillation-type processes, and this means that the feed temperature is often within 150° to 275° F. of the pipe-still (or heater) outlet temperature.

Of course, higher preheat temperatures are possible for the feed material if it is routed to associated high-temperature processes (such as cracking) but such process schemes only borrow heat from one process operation and deliver it to another (see Figs. 7-10, page 240 of the Fourth Edition of Petroleum Refinery Engineering, McGraw-Hill Book Co., Inc., 1958). Such variations must, of course, be accounted for in studying a specific unit, but the normal or average net heat input (absorbed) usually consists of 150°-275° F. of sensible heat plus the latent heat required for vaporization.

In relatively low-temperature hydrocarbon fractionator systems the net heat input may be kept as low as 50° F., because heat is supplied from steam (which is expensive). However, these same processes usually employ reboilers and sometimes the reflux ratio is very high, which raises the total heat input to figures comparable to or higher than those for conventional heavy-oil processes (see Table 1). In some such operations, the sensible heat input is nearly insignificant.

Although oils have different specific and latent heats, such variations are small compared with the effect of temperature range and amount of vaporization. Accordingly, Fig. 1 is suggested as an approximation. Heat input per barrel feed ranges from about 25,000 to 85,000 B.t.u. Such heat inputs must be converted into heat generated (except in the case of heat derived from steam). Thus pipe-still efficiencies of about 59 to 71% must be applied, based on gross heating value. Thus heat generation ranges from a minimum of about 35,000 to 145,000 B.t.u. per barrel, plus any reboiler heat that may be needed, and fuel costs range somewhat as follows:

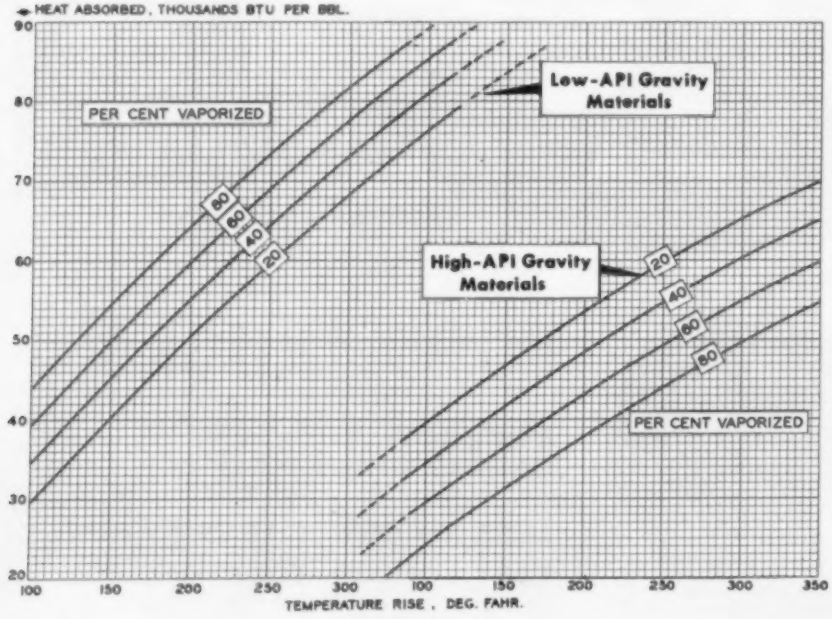
	Cents per bbl.*
Lowest	0.7-1.6
Highest	2.9-6.5

*At 20 to 45 cents per million B.t.u.

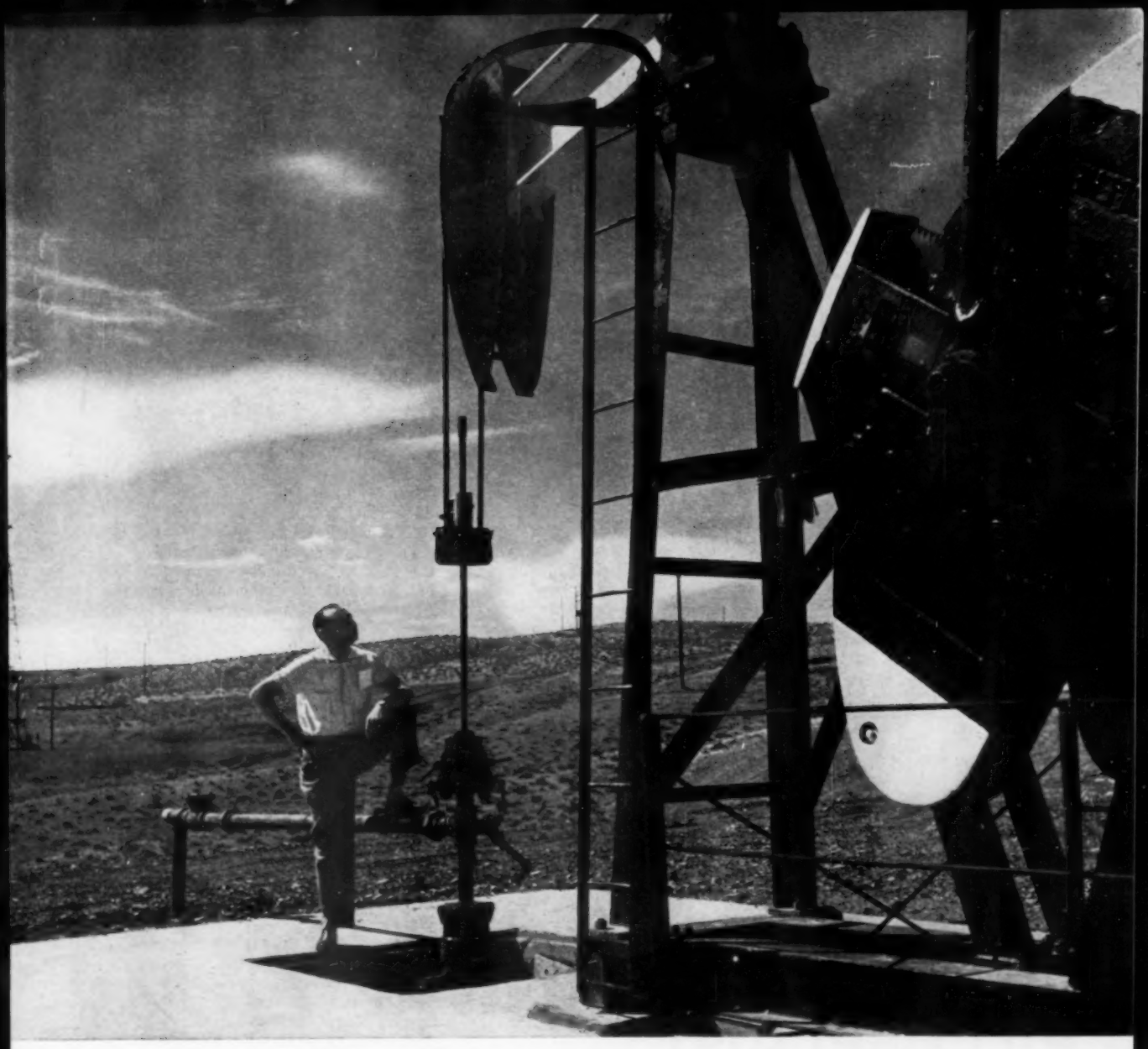
Reboiling is applied primarily to materials lighter than gasoline and such materials have latent heats exceeding 100 B.t.u. per lb. On such a basis, refluxing adds to heat inputs somewhat as shown in Table 1.

TABLE 1—APPROXIMATE HEAT INPUT, B.T.U. PER BBL., DUE TO REFLUXING

Reflux ratio based on top product	Percentage vaporized			
	20	40	60	80
1	5,000	10,000	16,000	21,000
3	15,000	31,000	47,000	62,000
5	26,000	52,000	78,000	103,000
10	52,000	103,000	154,000	206,000



APPROXIMATE INPUT of sensible and latent heat for distillate-type processes. Fig. 1.



Two years of pumping duty for X2's in the Tensleep

A 3300-ft string of ¾-in. Bethlehem X2 Sucker Rods recently completed its second year of service in Well 48 of Empire State Oil Co., in the Hamilton Dome Field, near Thermopolis, Wyo. The well, part of a government lease in the Tensleep formation, has been producing 171 bpd of 15.1 gravity oil, with only .02 pct water. The Bethlehem pumping unit, a 114D-16S, operates at 16 spm, using a 54-in. stroke.

Bethlehem X2 Sucker Rods are ideal for steady, low-cost performance in medium pumping duty, whether in non-corrosive wells or those which are properly inhibited. This quality rod is forged from AISI 1036 carbon-manganese steel, and is then normalized to provide the uniform mechanical properties required for this type of service.

It will pay you to look into the possibilities of the X2 rod, either for new wells or as replacements in existing strings. Talk it over today with your Bethlehem sucker rod distributor. Or write direct to us at Bethlehem, Pa.

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The role of PILOT PLANTS in processing—and what you ought to know about them

BY D. J. ORIOLO
Catalytic Construction Co.

THE PILOT PLANT plays an important part in petroleum and petrochemical processing. It is used:

- In the over-all development of a new process or in the improvement of an existing process.
- To study practical applications of unit operations in engineering research on a process or a class of processes.
- To produce marketable lots of new products for sales development and commercial exploitation (market research).
- To act in a trouble-shooter capacity for an existing commercial plant (technical service).

This article is devoted to considerations in the decision to install a pilot plant, design factors, operating problems, and problems in scale-up of data to commercial plants.

REFINING

New processes . . . In developing a new process, the prime objective of a pilot plant is to provide reliable engineering information, sufficient to design a feasible commercial installation. Such information should include criteria on equipment, scale-up, materials of construction, instrumentation, flow and heat transfer data, influence of contaminants on yields and product quality, and general operating characteristics of process.

A pilot plant is expensive to install and operate and it is advisable to keep pilot-plant work to a minimum. The chemistry, the feasibility of the process, and a significant amount of design data, such as on reaction rates, can be obtained from relatively inexpensive laboratory equipment although there are usually some aspects of the process development program which must be investigated in pilot facilities before the commercial plant can be erected.

Technical service . . . A pilot plant is often installed to perform technical services or to act in a trouble-shooting capacity for an existing commercial plant. Such a pilot plant is employed for process improvement and productivity studies; to check the suitability of feed stocks, including substitute raw materials and solvents, before the commercial trial; and to prove correct instrumentation, including adequate and simple controls for the operation.

This type of pilot plant is sometimes built to provide for improvements and to resolve operating problems, prior to the start of actual operation of the commercial plant, with the products being sold for market research purposes, whenever possible.

Ideally, such a pilot plant is located close to its commercial counterpart and is operated as long as the commercial plant is in service, or, at least, until the commercial plant is in successful operation.

Market research . . . New products for commercial exploitation are produced generally in batch equipment, keeping costs and the amount of engineering development work to a minimum. The quantities produced will vary depending on field testing or sales-development requirements. A pilot plant, erected for process development or technical service, becomes more attractive when its products can be sold for consumer testing.

Engineering research . . . Various educational and industrial organizations

perform systematic studies to obtain engineering and design data and general operating characteristics of equipment, and control instruments. These tests are generally conducted in small prototypes of standard manufactured equipment and, in many instances, in cooperation with the manufacturers of such equipment. The studies may cover any one of a number of unit operations, such as fluid dynamics, mass transfer, heat transfer, fluid mixing, fractionation, filtration, and others.

In addition to practical applications derived therefrom, these studies serve to strengthen the theoretical approach to unit operations and make it increasingly feasible to calculate the expected performance of commercial equipment without resorting to pilot tests in mockup models.

Preliminary Assessment of New Processes

Many phases exist in the development of a new process from the original idea to the full-scale, commercial production plant.

First, the research chemist establishes the chemical features of the process, including basic data on reaction rates and mechanisms; product yields and quality; required laboratory methods of purification; and physical and chemical characteristics and properties of raw materials, intermediates, products, and byproducts.

The next step involves a preliminary assessment with the basic objective of determining whether it appears feasible and economically attractive to develop a process from the basic research, engineering, and market information available. Such an evaluation must assess:

- What is known and unknown about the process.
- What additional development work is required to establish the process, including the influence of the time required and cost of doing such work on over-all costs.
- The effect of these products on existing or potentially new markets.
- Where the commercial plant site is to be located.
- The desired rate of commercial production.
- The estimated figures for capital investment and manufacturing costs.
- Profitability that can be expected, based on a preliminary plant design.

Economics . . . In evaluating proposed projects, it is customary to relate potential earnings to capital investment and to sales in order to establish economic yardsticks, such as return on investment, return on sales, and payout period. Such an evaluation should anticipate alternatives or modifications of processing steps in the preliminary design under consideration and should reflect the economics involved.

If the preliminary assessment indicates that the process is uneconomical, it is important then that a decision be made to drop all further investigations. No consideration should be given to the erection of pilot equipment on the hope or hunch that a pilot-plant demonstration will prove that the process is economical.

However, if the results of the preliminary assessment are favorable, indicating a suitable payout period for the projected commercial enterprise, the next requirement in the program is to ascertain the extent of further development work in pilot facilities before starting the commercial-plant design.

In some instances it may be advisable to proceed with the design of the full-scale plant using laboratory data and without resorting to a pilot-plant investigation. In other instances it may be decided to erect the commercial plant while the pilot-plant work is under way or even before any pilot-plant studies are initiated.

For these situations it is particularly important that the full-scale plant be designed by a competent engineering force, with a wide diversity of experience in unit operations and a variety of processes and with sufficient know-how to translate laboratory data into feasible commercial designs. Such a plant design should provide sufficient flexibility so that required adjustments to the plant can be made with a minimum of expense and down time following the initial shakedown tests.

Factors Influencing Program

When it is decided to erect pilot facilities to further the development of a new process, specific consideration must be given to the following factors:

1. Extent and duration of pilot-plant program.
2. The size and type of pilot facilities to use.
3. The process and engineering information needed to develop a feasible commercial design.

Extent of program . . . The extent and duration of the process investigation in a pilot plant is dependent largely on what is still unknown or uncertain about the process, following laboratory research studies, and whether it is necessary to pilot all phases or just certain steps of the process. The element of time is an important factor in such decisions in that money is lost while waiting for a full-scale production plant to start operation.

Another factor is that the new process may be similar to an existing process, thus eliminating the need for extensive development work. Finally, consideration must be given to what is known about the process or can be calculated for scale-up to a commercial plant with assurance that it will operate successfully.

Auxiliary systems to the main processing steps in a commercial plant can be designed in most instances, without requiring any research and development studies. Examples of such auxiliaries would be utilities, storage and feed handling facilities, and most fractionation systems. Disposal of plant wastes, however, could prove to be a major problem, particularly if the operations are hazardous or indicated to be a public nuisance; in which case it would be highly desirable to study means for adequate disposal of such wastes in suitably sealed pilot facilities.

Size and type . . . There are no rules for establishing the size and type of pilot facilities to use for a particular process study. Good judgment, backed by experience, and a sound appreciation of the costs involved, is required to define the minimum equipment requirements for achieving the desired objectives. Time and money should not be spent developing information on minor or auxiliary equipment, such as a water condenser, the performance of which can be calculated or obtained from the manufacturer.

A factor influencing equipment size would be a knowledge of the accuracy of scale-up to plant design from the smallest sizes of pilot equipment that will duplicate conditions of plant design. The amounts of products which may be required to satisfy market research requirements may also have a bearing on size, at least, for some of the pilot facilities.

A decision must be made as to whether operation is to be continuous or batch. In the petroleum industry, production capacities are large and continuous operation is common. In the chemical industry, continuous operation may not be desirable, particularly if batch operations gives a higher yield of better-quality product at a lower operating cost. On the other hand, a batch operation may not be desirable for some chemical reactions where the heat evolution is high and the product is sensitive to heat.

Bench-scale equipment is relatively

inexpensive to install and operate and should be used whenever possible to obtain reaction rate data. Parts of a process can be studied in mockup models, thus avoiding the need for a complete pilot plant.

A complete pilot plant, however, may be justified when it is considered advisable to integrate all the process steps including recycle streams and thus afford a means to study reaction variables, flow problems, control instrumentation and general operating characteristics in a manner closely simulating commercial performance. Design and operating data gained from such an integrated pilot plant often lead to a strengthening of the basic patent position.

Scale-up considerations . . . In selecting pilot facilities, it is best to use industrial types which can be readily purchased and the results on which can be duplicated and extrapolated to commercial performance. An advantage of this practice is that the manufacturers of the equipment can render valuable assistance during both the pilot plant work and the design of the commercial unit.

As an example of such services, suppliers of equipment, such as filters, centrifuges, agitators, evaporators and crystallizers will conduct tests on samples furnished by the customer and submit recommendations on scale-up to commercial-size equipment.

Reaction-rate data can be obtained in simple bench-scale equipment, thus avoiding the need for expensive pilot-plant facilities. Such data can be translated to continuous reaction and scale-up predictions can be made on the size and number of reactors in use.

It must be recognized that pilot-plant equipment of the same geometry as the full-scale counterpart will not necessarily give results which can be extrapolated directly to commercial performance. Critical variables, such as linear velocities, pressure drops, heat-transfer rates and surface to volume relationships change with increase in equipment size and in evaluating these factors, it is desirable to simulate commercial requirements as closely as possible.

Heat effects resulting from the release or absorption of heat may not show up appreciably in pilot facilities because of the large ratio of heating surface to volume involved, whereas, such heat effects would be quite significant for commercial equipment. Some other factors which can create problems in scale-up are concerned with vapor release capacity, particularly as it may affect entrainment; channeling and nonuniform distribution over beds of solids; multiphase contact between liquids, etc.

Materials and Construction

An important objective of the pilot plant is to establish materials of construction for the commercial plant. An appreciation of construction materials is obtained during laboratory research studies but it remains the function of the pilot plant to select the cheapest construction materials which would permit the commercial-plant equipment to operate for a maximum useful life with low maintenance expenses and with a minimum possibility of emergency shutdowns for repairs.

In addition to evaluating corrosion relative to construction materials, it is to be emphasized that corrosion could produce contaminents which could seriously affect product yields and quality. A few of the important factors which influence corrosion are:

1. Bimetallic construction. Galvanic corrosion, with the resulting attendance of undesirable corrosion products, may occur when dissimilar metals are contacted in a conducting medium, such as, for example, in a heat exchanger (tubes of different metal construction than the shell). Dissimilar metals and alloys should not be used indiscriminately.

2. Velocity of process fluid. High velocities of flow may cause mechanical wear, or erosion, of metal surfaces. This is particularly true of slurries containing abrasive solids, which are usually handled at high velocities (3 to 15 ft. per second) in order to minimize settling out of suspended solids.

3. Temperature. Side reactions, causing undesirable contamination, could occur by the catalytic action of metal surfaces exposed to fluid. Such a reaction is usually more pronounced at higher temperatures.

4. Properties of corrodant. The degree of acidity or alkalinity and of oxygen or oxidizing agents influence corrosion. In addition, impurities in a process medium, even when present in trace quantities, can markedly influence the corrosive action. For example, trace amounts of iron chloride salt will greatly accelerate the corrosive action of muriatic acid.

Practices vary regarding the materials of construction to use for pilot-plant equipment. In some instances, the pilot plant may be constructed of materials contemplated for the commercial plant, particularly if evidence indicates that differences in metallurgy would adversely affect product yields and quality.

A conservative but an expensive and often unnecessary procedure is to construct the pilot equipment of expensive alloy materials which are more than adequate for the corrosive conditions and install test coupons in the circulating streams for evaluating corrosion.

Another approach, which is the cheapest but one subject to the greatest risk, is to build the pilot plant from the cheapest materials which might stand up and install test coupons for corrosion evaluation.

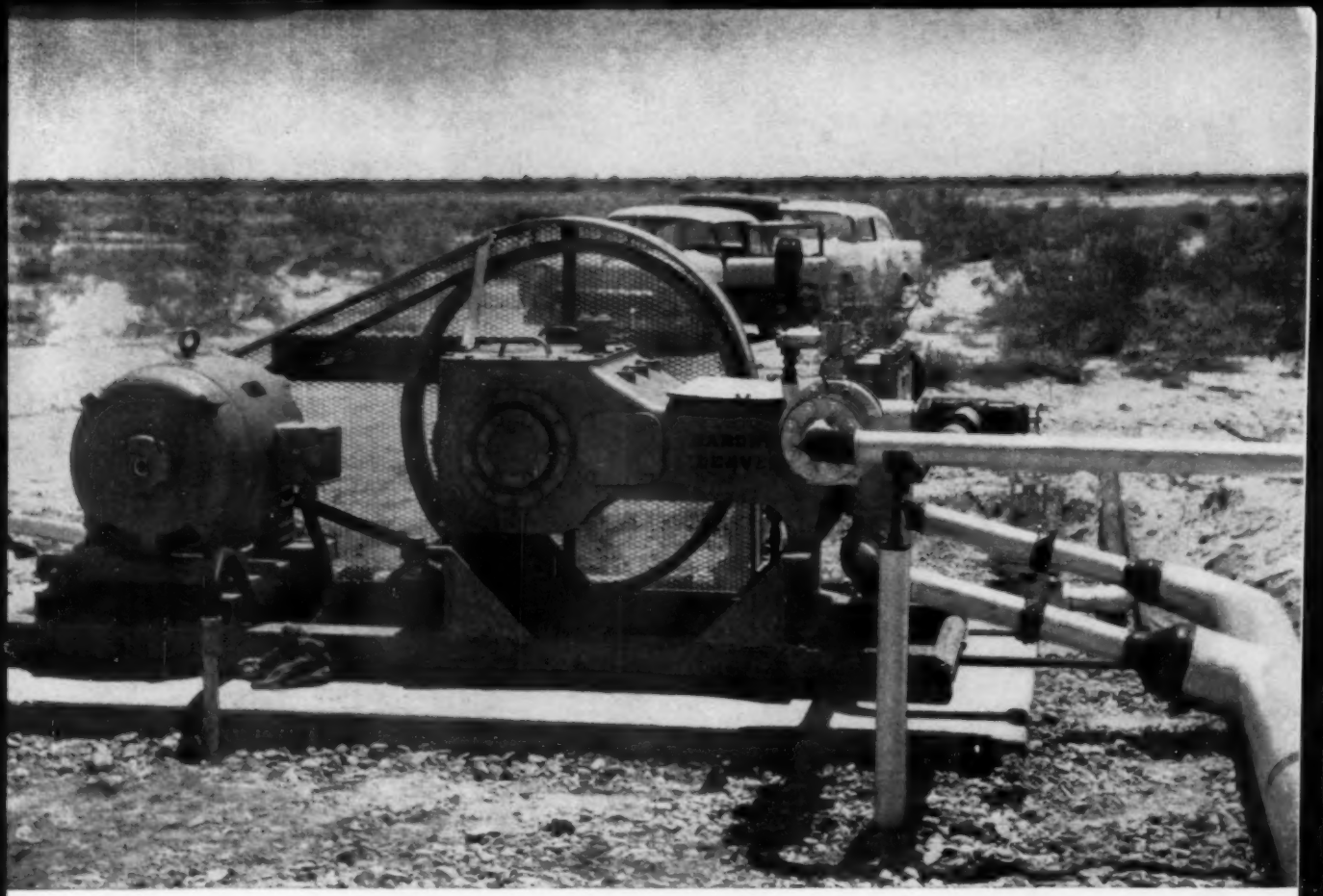
Auxiliaries . . . When using various services, such as process water, cooling water, electricity, steam, gas, etc., in pilot-plant studies, full recognition must be given to the utilities contemplated for the commercial plant. For example, a heating jacket on an agitated vessel or a reboiler on a pilot fractionator may use a heat-transfer medium which may be out of the range of service contemplated or too expensive to use for the projected full-scale equipment.

The use of different water, whether for process or cooling service, may create problems and it is important that a check be made of the water planned for the commercial plant. A treatment scheme would have to be developed if it is found that process water adversely affects the reaction or process service or that cooling water produces unusual scaling and sludge problems.

Process variables . . . Variables to be studied for a particular process will, of course, depend on the reaction and the mode of operation involved. Reaction temperatures; pressures; retention times; concentration of reactants and catalytic agents; space velocities; and external and internal ratios of circulating reactants, particularly where recycle streams are involved, represent some of the major reaction variables investigated.

Trace contaminants from raw materials or impurities introduced through water and foreign agents such as chemical cleaning agents and equipment lubricants could create perplexing problems in commercial operation and be entirely missed in the pilot-plant work.

Certain types of solid catalysts could become poisoned over a period of time by trace quantities of impurities such as arsenic or iron compounds (for example, mill scale in pipes). Where cycle operations are involved, it is important to establish whether trace contaminants build up in recycle streams with resulting adverse effects on product yield or quality.



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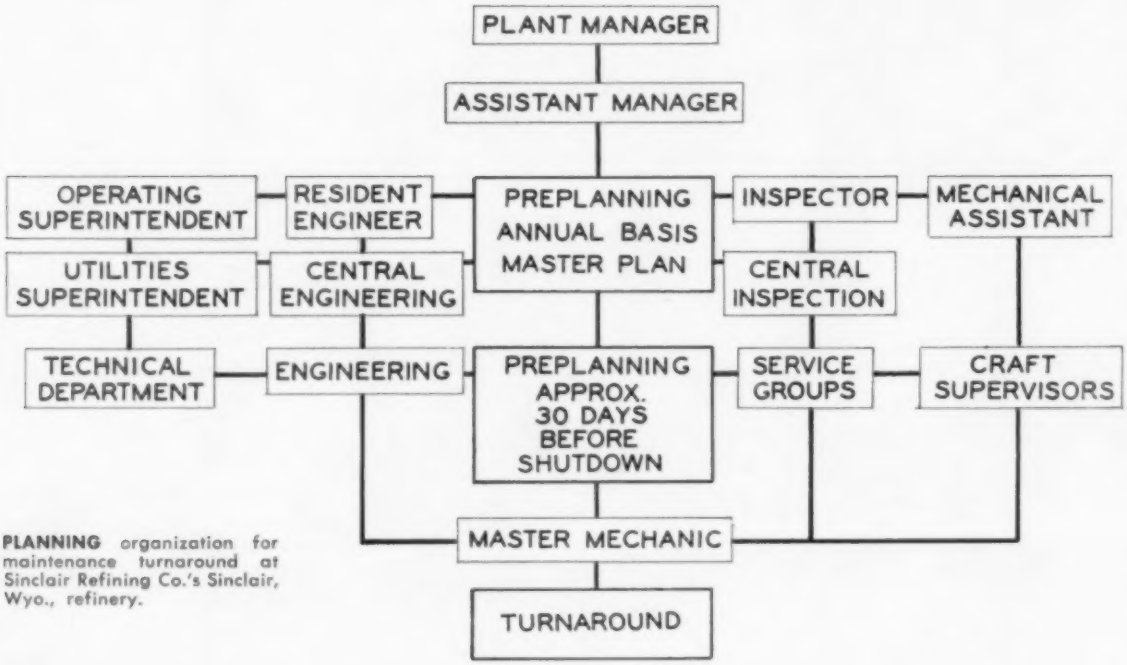

PLANNING organization for maintenance turnaround at Sinclair Refining Co.'s Sinclair, Wyo., refinery.

Planning the turnaround

at a small refinery

"Our planning system is not perfect in any sense of the word, but it is economical and it has provided effective turnarounds."

BY GEORGE M. ALLEN
Sinclair Refining Co.

MAINTENANCE - TURNAROUND PLANNING at Sinclair Refining Co.'s Sinclair, Wyo., refinery consists of an integrated group effort, made without the aid of a specific planning staff.

The over-all planning divides into three parts: (1) pre-preplanning, (2) preplanning, and (3) shutdown. Part 1 begins when the unit comes on stream, with thought being given to possible maintenance required at the next turnaround, 1 year away. Part 2 begins when the master plan is completed.

This system is the result of 15 years of trial-and-error methods dedicated to fast, efficient turnarounds through joint responsibility.

Paper presented at WPRA regional meeting, Casper, Wyo., 1958.

Maintenance turnaround planning at Sinclair consists of a group effort without the aid of a specific planning staff.

Scope of work . . . Turnaround maintenance consists of repairs to a 10,000-bbl. per day fluid catalytic cracking unit, its stabilization and alkylation units, two 100,000-lb. per hour 600-psi boilers, auxiliary water treating facilities and all electrical facilities that can be attended.

These units were all built in 1943 as part of a World War II expansion program and have been in continuous operation 15 years. The shutting down of these units cuts daily production by approximately half, consequently the stock inventory before and after turnarounds is seriously affected by all offstream hours.

These units are scheduled for repair once a year, with an approximate allowance of 2 weeks of down time to effect repairs and all of these units are repaired simultaneously. Actual date of shutdown is tentative, contingent upon such factors as stock situation, material supply, manpower situations, etc., but for the past several years this date has been set for the first 2 weeks of May and all planning is directed to this date.

Location a factor . . . Our planning is affected considerably by our location, which is approximately 250 miles to our nearest major supply

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Shown above is **Fig. 625**, a general service valve which is particularly applicable where full, unobstructed flow is desired. This type, available in bronze-trimmed or all-iron style, either flanged or screwed, is made in fifteen sizes, from 2" to 24"—and is typical of the better values offered by the entire line of R-P&C Electric Iron Valves.

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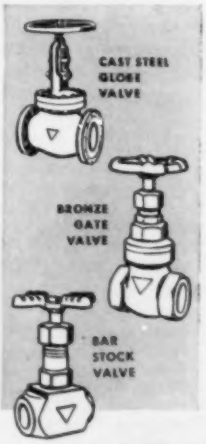

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"Skilled crafts are obtained from regular plant forces."

point and available skilled manpower market. This fact forces us to maintain our own supplies and equipment as well as do the work with our own plant force. Specialties such as regenerator lining or repair of electric-generating facilities are contracted to specialty contractors when necessary but our planning keynotes the use of our own maintenance force.

We do supplement our force from a limited local labor market but this is temporary help of nonskilled nature. Skilled crafts are all obtained from our regular plant forces. Our average mechanical force available for turnaround work, excluding supervisors and service forces is approximately 120 mechanical department employes subdivided to approximately 71 men at the fluid unit, 27 at the alkylation plant and 22 at the boiler and power house.

Mechanics of our planning are handled as a joint operation with management directing all supporting departments in a combined effort.

Our turnaround planning is a year-round project which progresses daily until the turnaround is complete.

Pre-Preplanning

Pre-preplanning of the initial stage, consists of a management meeting held as soon as inspection and maintenance reports are available from the last turnaround. This meeting is attended by plant managers and staff representatives from operating, engineering and mechanical departments.

A review is made of the last turnaround for the purpose of evaluating the general mechanical condition of all the operating units involved. From this review an attempt is made to forecast which parts of each unit will require major attention for the next turnaround or future turnarounds. Inspection reports and recommendations, known wear rates, line-section analysis, operation studies, foremen's recommendations all are given consideration and a tentative plan is established.

This plan then acts as a guide for further study by individual departments. This procedure allows considerable time for extensive engineering, operation, inspection studies and in general allows plant forces to get a good head start on turnaround work.

Record keeping . . . From this point until the start of our second-stage planning, notes are kept regarding all items which will require attention during turnaround. This information is logged by unit foremen but is also disbursed daily to the mechanical department by discussion at operational meetings held every morning.

The resident engineer attends this meeting and in turn alerts the mechanical department of work at these units which will have to be done during turnaround or that can be done while the units are on stream. Information from this source alerts our maintenance forces of work that can be completed months ahead and forms a skeleton outline of preplanning turnaround.

This skeleton outline continues to grow until approximately 30 days before turnaround. It is then reviewed, brought up to date and turned over to the mechanical department. Here work lists are prepared for each unit and then subdivided into sections of units such as reactor, regenerator, blowers, etc., and then subdivided again to individual jobs relative to each section.

These work lists are quite extensive and detailed to include such points as: safety notes, blinding schedules, manway schedules, work to be performed by operators, technical personnel and individual mechanical crafts, what materials are required and where they are located, reference to drawings, sketches, reports, etc.

The work list for the 1957 catalytic cracker alone consisted of 250 major items and 83 sub-items. All other operating units concerned during turnaround are handled in the same manner.

Unit supervisors help . . . Individual operating-unit supervisors play a big role in our planning during this stage. They not only note the jobs to be done but they evaluate them and notify maintenance of practical difficulties. Their understanding of operation allows them the knowledge of what is or is not important or that which can be handled at a later date and should not receive unwarranted attention. Many years of actual turnaround experience are required to be able to render sound decisions in many of these cases.

Preplanning

At this point our pre-preplanning is complete, the master plan has been consolidated, and preplanning begins. A meeting of all supervisory personnel connected with shutdown is held and persons attending are as follows: plant manager and assistants, operations representatives, technical assistants, resident engineer, master mechanic, inspectors, personnel manager, craft supervisors and interested parties from the central engineering division of Sinclair Refining Co.

At this meeting the entire group of work lists is reviewed, assignments made and questions answered. Each interested party receives a copy of the work lists and it becomes his responsibility to get as much work as possible completed or ready for shutdown. Joint responsibility still prevails at this point but the entire program of actual work comes under the jurisdiction of the resident engineer and master mechanic who coordinate staff and line functions and generally keep the ball rolling toward turnaround.

The close harmony that exists as we get ready for turnaround is the result of many years of experience. In fact, we do not have a line supervisor with less than 10 years of turnaround experience. This is of great value to preplanning and to actually doing the job.

TABLE 1—HIGH AND LOW PERCENTAGES DEVELOPED FROM TURNAROUND DATA

Craft requirements: Per cent of work performed by craft of total manhours required by unit	Catalytic cracking unit		Alkylation unit		Boiler and power facilities	
	High	Low	High	Low	High	Low
Welders and boilermakers	29	25	6	5	13	10
Machinists and mechanics	16	13	18	12	36	27
Pipefitters	26	22	59	52	22	18
Insulators	4	2	6	3	9	2
Riggers	12	7	14	6	5	1
Bricklayers	4	2	1	0	7	3
Electricians	3	3	1	0	2	1
Carpenters	9	6	4	3	1	1
Assigned cranes, trucks, tractor operators	3	3	1	1	1	1
Labor	8	5	10	3	27	19
Per cent of premium pay hours of total manhours required	31	27	24	17	33	25
Average number men per day used	78	71	31	27	23	20
Per cent of total mechanical hourly force	45	38	17	16	13	11
No. of days required shutdown	15	10	15	10	10	10

"No leaves of absence or vacations during turnaround time."

Nevertheless, the following must be given consideration:

Manpower . . . Mechanical forces are enlarged by reducing operating manpower to a bare minimum and transferring these men to mechanical labor; setting up student mechanics to Class A mechanics, and assigning all mechanical employes possible to turnaround work.

In addition, no leaves of absence are granted and no vacations are allowed 2 weeks before, during, and 2 weeks after the scheduled shutdown.

Mechanical equipment . . . All equipment and tools are repaired, placed in first-class operating condition and moved to the units before shutdown. Every effort is made to locate this equipment in the immediate vicinity where it will start work.

Rigging equipment is set and rigged and scaffolding is distributed to the various locations and floors for easy access. Welding machines, hoists, tools of all types are distributed to the units concerned several weeks before actual shutdown. Consequently they must be conveniently located but must not interfere with still operation. This requires detailed planning by craft supervisors with knowledge gained from previous turnarounds.

Equipment replacements . . . Equipment such as exchanger bundles, slide valves, large valves, piping sections, etc., are installed as whole units whenever feasible. To do this we carry spare units for all items that have high wear rates or other operating problems. This equipment is used every other year and rather than try to effect repairs during a shutdown, we replace them if manhours can be saved.

The displaced equipment is then reconditioned between turnarounds as fill-in work. We have been able to standardize this work to a high degree, even to the extent of assigning the same craftsmen to make the same replacements each turnaround. By doing this the craftsmen are familiar with the problems of replacing these units and are able to achieve fast and correct installations.

This avoids the time-consuming proposition of assigning new men to new work which invites longer handling time and the possibility of incorrect installation.

When a replacement unit is reconditioned and ready for service, we make it a part of the job to transport it to the exact site on the operating unit where it will be used or to the immediate vicinity whenever possible.

Replacement materials . . . Valves, fittings, pipe, wear pads, plates, all are brought to the job site and stored on the units as close as possible to known use. Sizes and types are scheduled and it is a craft supervisor's responsibility to have the materials required at the job site before shutdown. We make every effort to have all materials on the job to avoid holdups. Even to the extent of having too much on the job and having to return it after the shutdown.

In connection with material supply, our catalytic cracker has one combination freight and passenger elevator to cover 8 floors of a 13-floor unit. Consequently, all movements that can be made before shutdown are made to prevent bottlenecks during shutdown.

Approximately a week before actual shutdown, a final preplanning meeting is held to check all items on the work lists. At this meeting all items are discussed in the sequence in which the work will be performed. Coordination is the keynote and everything is pointed to this goal. Work bottlenecks, timetables, craft problems, hours of work and feeding problems of crafts working overtime are all lined out and at the end of the meeting supervisors are ready for turnaround.

Shutdown

To get turnaround off to a good start we schedule the units to start down over a weekend, then we bring out a limited number of pipefitters on Sunday to start blinding and opening vessels. This allows a large part of our task force to go right to work Monday morning, as parts of the units will be cool enough to work on. In addition, we change our work day from 8 to 9 hours and include Saturdays and Sundays on bottleneck jobs during the turnaround.

At this point we enter the final stage—turnaround of the units. Here joint responsibility ends and all effort is under the direct control of the master mechanic. Daily planning meetings are held each afternoon at the fluid unit to plan the following day's work. At this meeting preplanning schedules are checked and adjustments for additional work or deviation from schedule are handled on individual-project merit.

This generally calls for revamping craft schedules such as additional overtime or shift work. It has been our experience that our thinking during this period must be very flexible because it would be difficult to count the number of times we thought we would encounter trouble at a particular point only to find it required minimum attention, and vice versa.

Timing . . . Timing and coordination are the big planning problems during the actual shutdown and an extensive effort has been made to ease this problem as much as possible through communication systems. We have loud-speaking equipment, portable hand radios, radios in trucks, telephone horn-blowing code systems and telephones strategically located on the units with direct lines to the storehouse.

All of these facilities are directed from the main control room at the fluid unit. This is considered headquarters for the master mechanic and all directives, changes of plan, or manpower or material problems pass directly through his supervision.

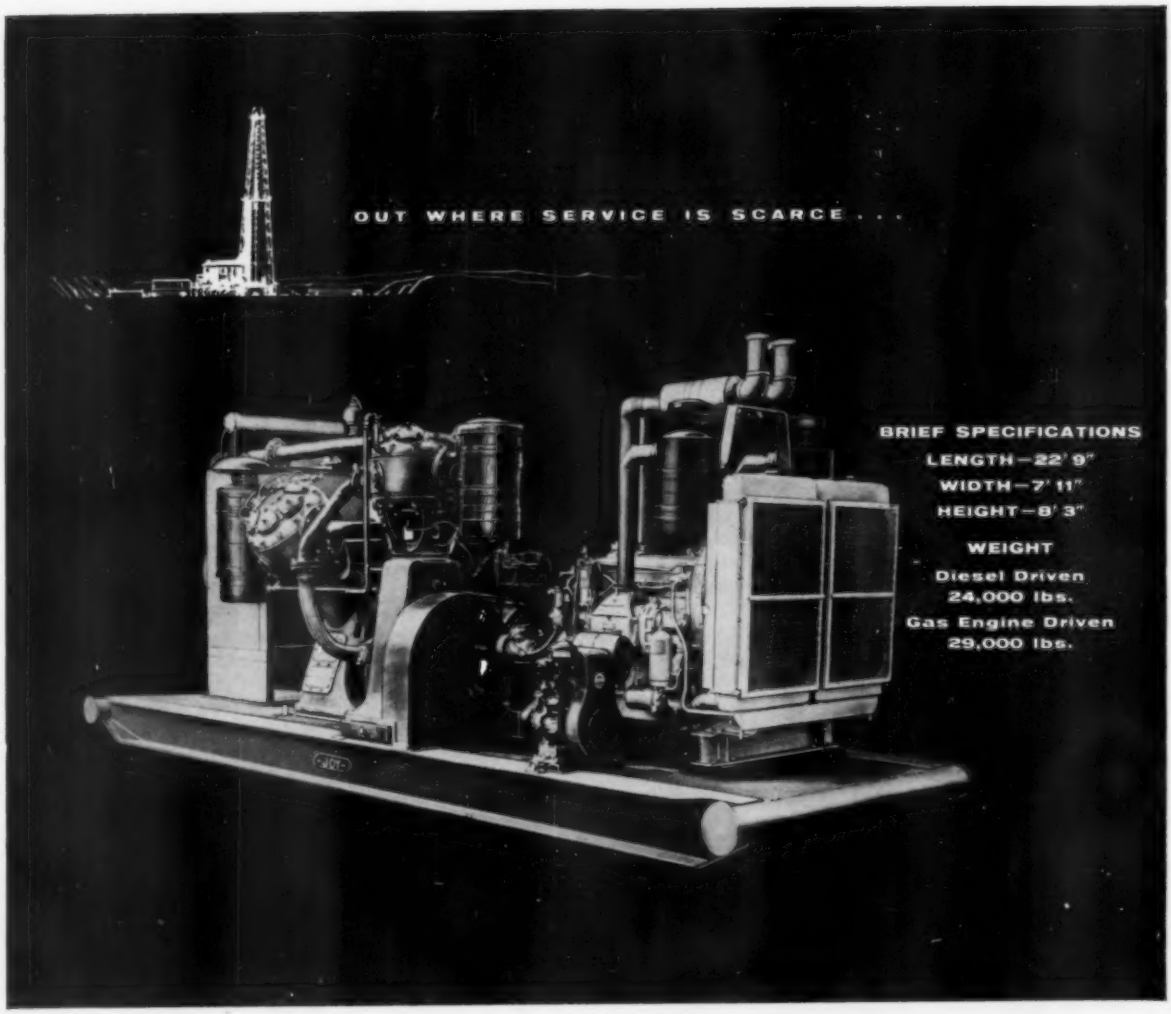
Our actual turnaround work has become standardized to the point of being routine. We believe this to be a very valuable asset in effectively planning a turnaround and in executing the plan. One of the prime values of this lies in the fact that the master mechanic is free of minor job decisions and can devote his thinking to over-all coordination.

Conclusions

The true value of turnaround-maintenance planning cannot be determined by statistical comparison of turnaround to turnaround or plant to plant, because of the ever-changing situation each year. The only tangible value that can be attributed to planning must be measured by the length of time the unit is down in relation to schedule.

During the early years of turnarounds at Sinclair, Wyoming, it was not unusual to have turnarounds two or three times a year with little or no assurance that the unit wouldn't fall down in between turnarounds. With the advent of turnaround maintenance planning we have reasonable assurance that we can operate continuously for a year without a loss of stream hours. This fact alone provides a definite payoff by allowing a tight schedule of plant operation without upsets.

There are also many tangible benefits that can only be observed and evaluated through local experience,



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but these benefits are definite and real money makers developed as a byproduct of planning.

Some of these benefits are as follows:

1. Close cooperation between operating and mechanical departments. As this program progresses continuously throughout the year it is absolutely necessary to have harmony between departments because of our limited available manpower. This not only applies to units involved in turnaround, but all units.

The other units are aware that they must be cared for in between turnarounds, and look to the future accordingly.

A second value received here lies in the fact that no one person is critical to planning and executing a turnaround. Everyone is familiar with individual department function and planning, and in the event of absenteeism, transfer, illness, etc., planning is not slowed down or affected in any way.

The overlap of department responsibility tends to broaden department knowledge of each other's function. This allows consideration for the practical or applied aspects of each department.

2. The same spirit of teamwork that exists with interdepartments carries to craft supervisors and craftsmen. By knowing what is expected during a turnaround, all departments have individual planning complete and ready to go at shutdown.

This tends to make everyone aware that he plays a very important part in turnarounds and success hinges on his fulfilling his assigned project. This medium of orderly thinking prevents confusion or lack of coordination on the job and allows crafts to spend their full working day doing the job.

3. Preplanning eases the problems of material and equipment supply by offering considerable time to overcome bottlenecks and allowing time to consider the many aspects of substitution.

Our location is such that if we didn't have materials or equipment on hand to do the job, our down time could be extended for lack of even minor items.

4. With any form of planning a large amount of historical data accumulates and this is true of our turnaround planning. From this data we have been able to establish definite trends or consistencies relative to each unit of our turnaround effort.

This in turn allows us to develop our manpower requirements for a given period of shutdown and distribute them to the various operating units as required. The insight acquired through accumulated data is a great aid to the flexible thinking necessary for planning turnarounds.

Some of the percentages which have become known to us through accumulated historical data are summarized in Table 1.

5. A silent benefit that we don't hear much about but which makes itself known by its record, is safety. Both the safety and inspection departments have a complete knowledge of the over-all plans and are in a position to recommend safe ways and means to do a job.

Our safety department states that the practice of safety during turnarounds is the best effort of the year. The record speaks for itself when we say the last lost-time accident to happen during shutdown occurred 4 years ago.

These are but a few of the benefits that we attribute to our preplanning maintenance turnarounds. It is our opinion that less supervision is required, service forces stay on schedule, crafts do better work, and more work is done each year without additional time.

Our planning system is not perfect in any sense of the word, but it is economical and has provided comparable and effective turnarounds. We recommend this system to all small plants that have men of experience ready and able to give just a little extra effort to get the job done right.

New BTX extraction plant

THE FIRST BTX extraction plant in the Mid-Continent area is in operation at the Vickers Petroleum Co., Inc., refinery at Potwin, Kans., 35 miles northeast of Wichita.

The new $3,500,000 Udex plant, completed on schedule by Procon, Inc., is designed to produce more than 15 million gallons of petroleum aromatics annually.

Products manufactured so far include benzene and toluene of reagent quality, along with xylene and Solvent V-100, Vickers' trade name for a high-flash-point solvent.

The new BTX plant is using feed stock from a recently completed Ultraformer with rated daily capacity of 3,500 bbl. The Ultraformer is producing 2,320 bbl. daily of depentanized reformate as BTX charge stock.

Benzene will rank as the most important of the new Vickers chemicals, with the largest consumers being the paint, rubber, and plastics industries. Benzene is also widely used in production of synthetic detergents, nylon, aniline, and insecticides. Toluene and xylene are used principally as solvents by the paint and lacquer industries.

The new unit will pave the way for the company's entry into other phases of the petrochemical field. The company's activities include production, refining, and marketing. The Potwin refinery has capacity of 16,000 bbl. daily.

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PRODUCTION

Cut sludge-handling costs

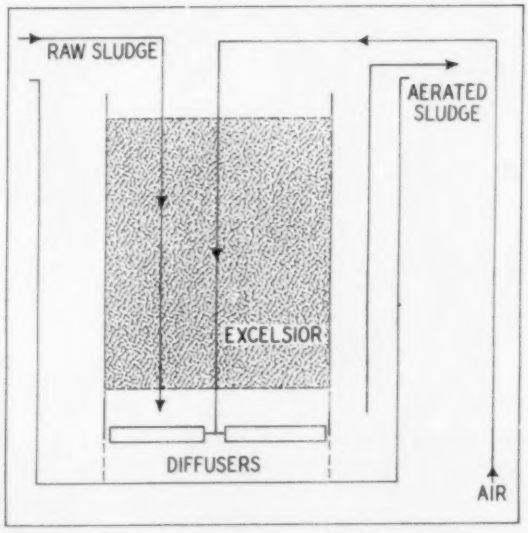
by $500 a month. Here's how one California plant did it . . .

New treating system at Santa Fe Springs sharply reduces amount of sludge that must be trucked away.

FORMERLY the sludge at Santa Fe Springs Waste Water Disposal Co. had to be trucked away at a cost of $800 per month. Today it's continuously aerated and chlorinated, then recirculated through the treating plant. Because much better dehydration is secured, the sludge-trucking bill is only about $150 monthly.

A portion of the savings in trucking is offset by higher sludge-treating costs. But since some benefit is had from recirculating chemicals used in primary treatment of the waste water, over-all operating costs have been cut $500 per month.

An intangible benefit is the reduction in the amount of hydrogen sulfide released into the atmosphere. Recirculation of the chlorinated sludge has been found to greatly reduce the amount of sulfides generated in the treated water. The volume released was always within limits set by air-pollution-control officials. But in the smog-conscious Los Angeles area, anything done toward reducing air pollution is always desirable.



TREATING TANK is used in pilot tests for aerating the sludge on a batch basis. Fig. 1.

Waste-water plant . . . The treating plant handles about 125,000 bbl. of waste water daily from Santa Fe Springs wells and surrounding fields. Over 1.1 billion barrels of water have been treated and filtered since the original plant was built in 1929.

The waste water is clarified by coagulation with sodium aluminate and activated silica. From a skimming basin, where the free oil is skimmed off, the water enters a flocculating basin where the chemicals are added. The settled floc is pumped from the bottom of the basin and run to sludge pits. A major portion of the clear water is filtered through magnetite filters and run to the Pacific Ocean. Remainder of the water is discharged directly to a sewer.

Before the new sludge-treating system was placed in operation earlier this year, about 10,000 gal. per day of sludge had to be trucked out. Early in 1957 when aluminum sulfate was used in place of sodium aluminate, the daily volume averaged 15,000 gal.

Because of the high cost of disposing of the sludge and the scarcity of approved sludge dumps, experiments were started in 1956 to see if the sludge could not be regenerated and recirculated. Added hoped-for benefits were reduced filter plugging and a reduction in the amount of hydrogen sulfide generated in the effluent water.

General properties of the sludge are as follow: Sulfide content, 500 p.p.m.; oil content 20,000 p.p.m.; density, 1.015. Its pH averages about 7.0. Simple laboratory tests indicated aeration and chlorination would make the sludge suitable for recirculation.

As the economics of the process depend upon the efficiency of aeration, various tests were run to determine what would be the best method. These indicated a packed column with air diffusers.

Pilot plant tests . . . Next step was to check the laboratory findings in a pilot plant. Almost 2 years of testing were required before the present method was developed.

Main difficulty centered around the aeration stage. Sprinkler aerators used often plugged after only a few hours' run. Small nozzles and jets likewise gave trouble.

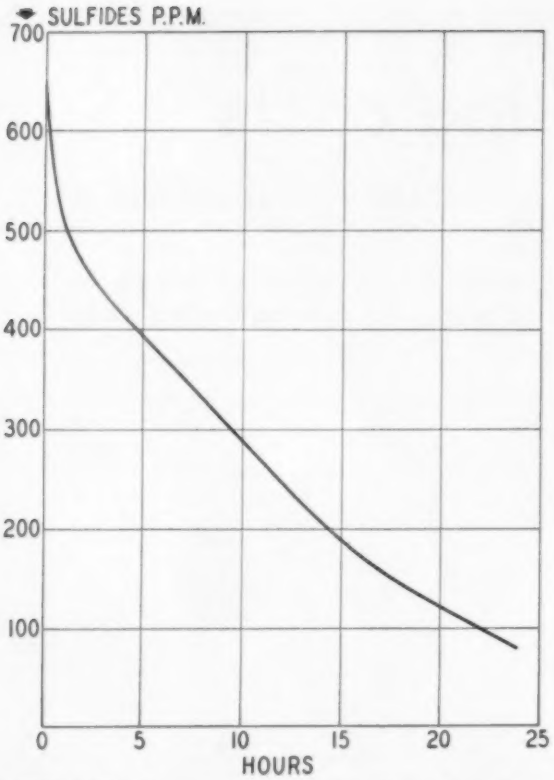
The method used in the pilot tests consisted of injecting air through eight 12-in.-long carborundum tubes placed below a packed excelsior column (Fig. 1). The 5-ft.-diameter well in which the excelsior was placed served both as a packed column and a circulating medium. The air lift created surged the liquid up through the shell and over the rim into the outer section of the tank.

Treating was carried out in batches, with chlorine being introduced (at a 5 to 10-lb. per hour rate) through a diffuser placed below the excelsior packing. After oxidation the sludge was dumped into a preliminary settling basin. There some of the oil floated off, and the remainder returned to the coagulating basin.

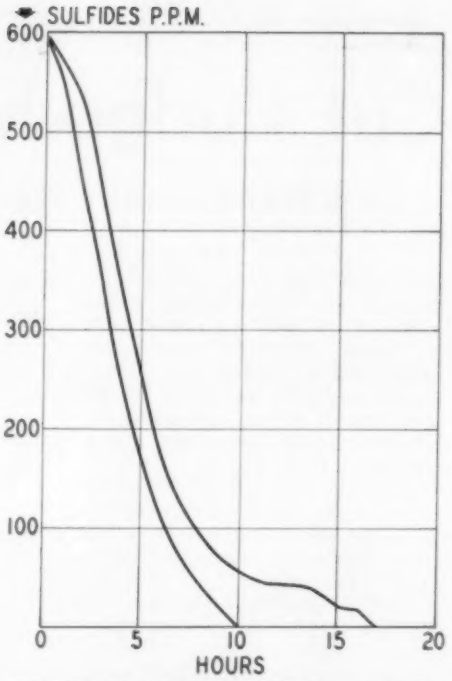
Aeration without a catalyst proved to be time consuming. As shown in Fig. 2, about 24 hrs. were required to reduce the hydrogen sulfide content to less than 100 p.p.m. After much testing a suitable catalyst was found.

Addition of a wetting agent enabled a 100 p.p.m. concentration to be reached in less than 8 hrs. (Fig. 3).

BY H. B. McCORD
Superintendent, Santa Fe Springs Waste Water Disposal Co. and
MELVIN ENQUIST
Metallic Phosphate Products Co.



WHERE AERATION was carried out without use of a catalyst, about 24 hours were required to reduce the sulfide content to less than 100 p.p.m. Fig. 2.



ADDITION OF A WETTING AGENT in concentrations of about 3,000 p.p.m. permitted the sludge to be quickly freed of objectionable sulfides. Fig. 3.

Some sludges responded more slowly than others, so that time for complete oxidation varied from about 10 to 17 hours.

For a period of 30 days all of the sludge was aerated, chlorinated and recirculated through the water-treating plant. This was accomplished by treating three batches daily. During this period the volume of sludge did not measurably increase.

Current Operations . . . Continuous sludge treating was started earlier this year, with air and chlorine being injected at the points shown in Fig. 4. Aeration was carried out in a 25,000-gal. wood tank equipped with a 6-ft.-diameter inner cylinder. The latter was packed with excelsior much the same as in the pilot plant. The same eight carborundum diffusers were installed below the packed column.

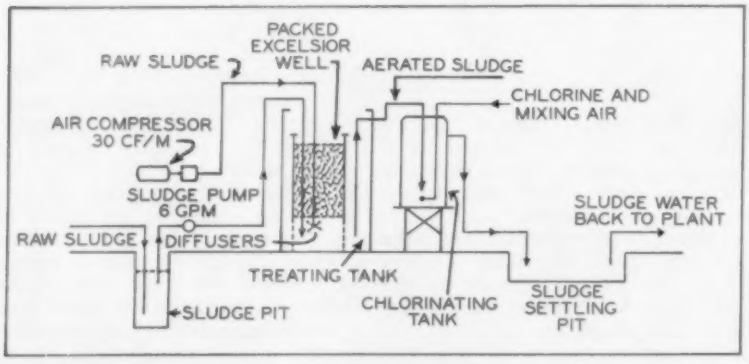
As was the case in the pilot plant, plugging of the diffusers was a major problem. A back-washing procedure was adopted which resulted in runs being extended from 15 to 30 days. But the method still was not satisfactory due to shutdown time.

The problem was solved by removing the eight carborundum diffusers and installing shop-designed diffusers in their place. These are designed so that 10-psi. air (at a rate of 20 cu. ft. per minute) flows through a small orifice and impinges on a baffle. Their aeration efficiency is below that of the diffusers but the plugging problem is eliminated.

Another change from the pilot-plant procedure was to remove the chlorine diffuser from the aeration tank. Chlorination now is carried out in an 800-gal. closed tank which receives the aerated sludge. The tank is equipped with air diffusers to obtain better circulation. Addition of water to the sludge prior to its aeration has been found to reduce the amount of chlorine needed to oxidize the sludge.

Using this procedure, a 6-months' run recently was concluded. Treating costs during this period averaged $390 per month, of which $120 was for chlorine, $120 for pumping, and $150 for hauling away excess sludge.

Improvements since that time have further reduced the amount of sludge which must be hauled away. A savings of about $500 monthly is being realized as compared with the former $800 trucking cost. About $500 per month also is being saved through reductions in water-treating chemicals. How much of this savings can be attributed to the recirculation of activated sludge through the plant cannot be determined, but is probably in the range of 25 to 30%.



METHOD USED for continuous sludge treating. Fig. 4.

The 175 ft. high Isobutane Fractionating Tower of The British Petroleum Company's new Alkylation Plant at Isle of Grain.

Britain's first alkylation plant goes on stream

The technician twists the valve that recently set Britain's first alkylation plant 'on stream'. This plant is part of The British Petroleum Company's Kent Refinery on the Isle of Grain. This BP Refinery now has the only complete unit for making Avgas in Britain. The new plant will produce 40 million gallons of Avgas a year.

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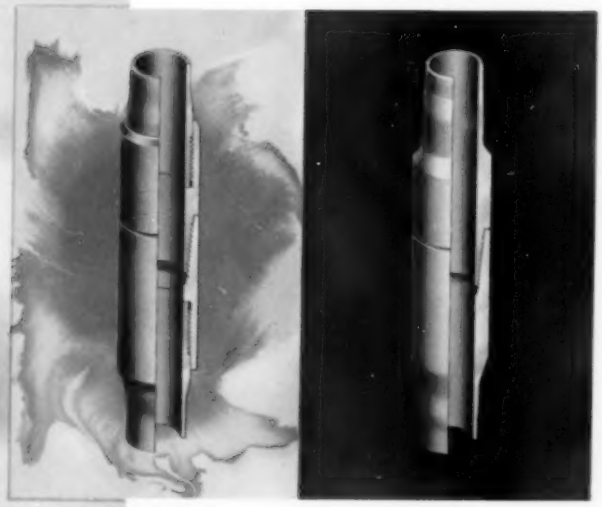

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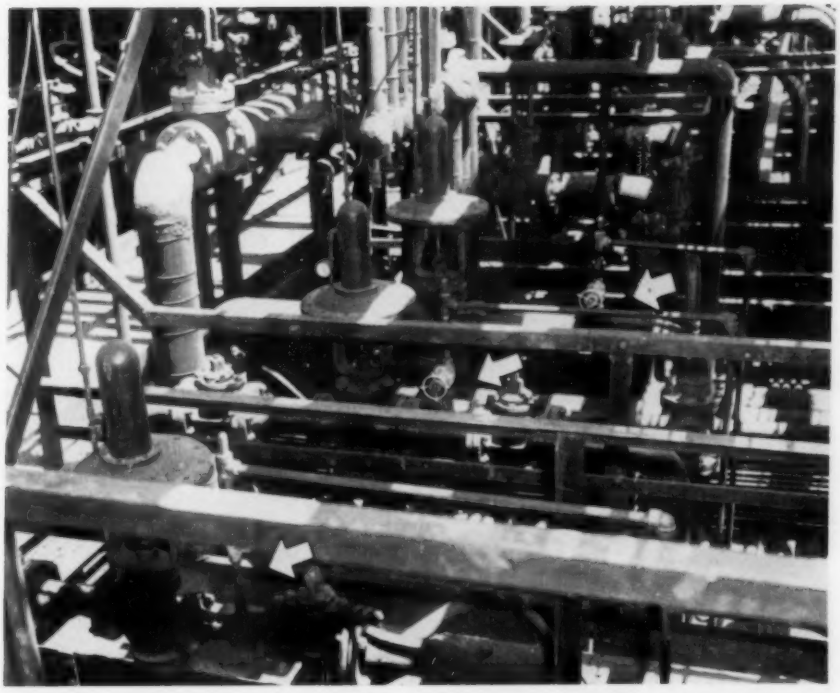


WATER-INJECTION LINES were placed upstream of firing valves on cat reformer heaters. This allows easy washing of the firing mechanisms.

BY LARRY RESEN
Refining Editor

Pure Oil Co. Nederland refinery program shows how to . . .

Reduce fuel-gas-line corrosion

RELATIVELY simple corrective measures can reduce fouling in refinery fuel-gas lines.

Experience gained at Pure Oil Co.'s Nederland, Tex., refinery shows that installation of water-injection facilities at critical points helps reduce fouling. These, with slight design modifications, can practically eliminate troublesome problems.

Significantly, the principal problem combated at the plant resulted from hydrochloric acid and ammonium chloride contained in catalytic reforming unit tail gas. With this type of unit quite commonplace in refineries, Pure's solution—an intermittent water wash—will be of interest.

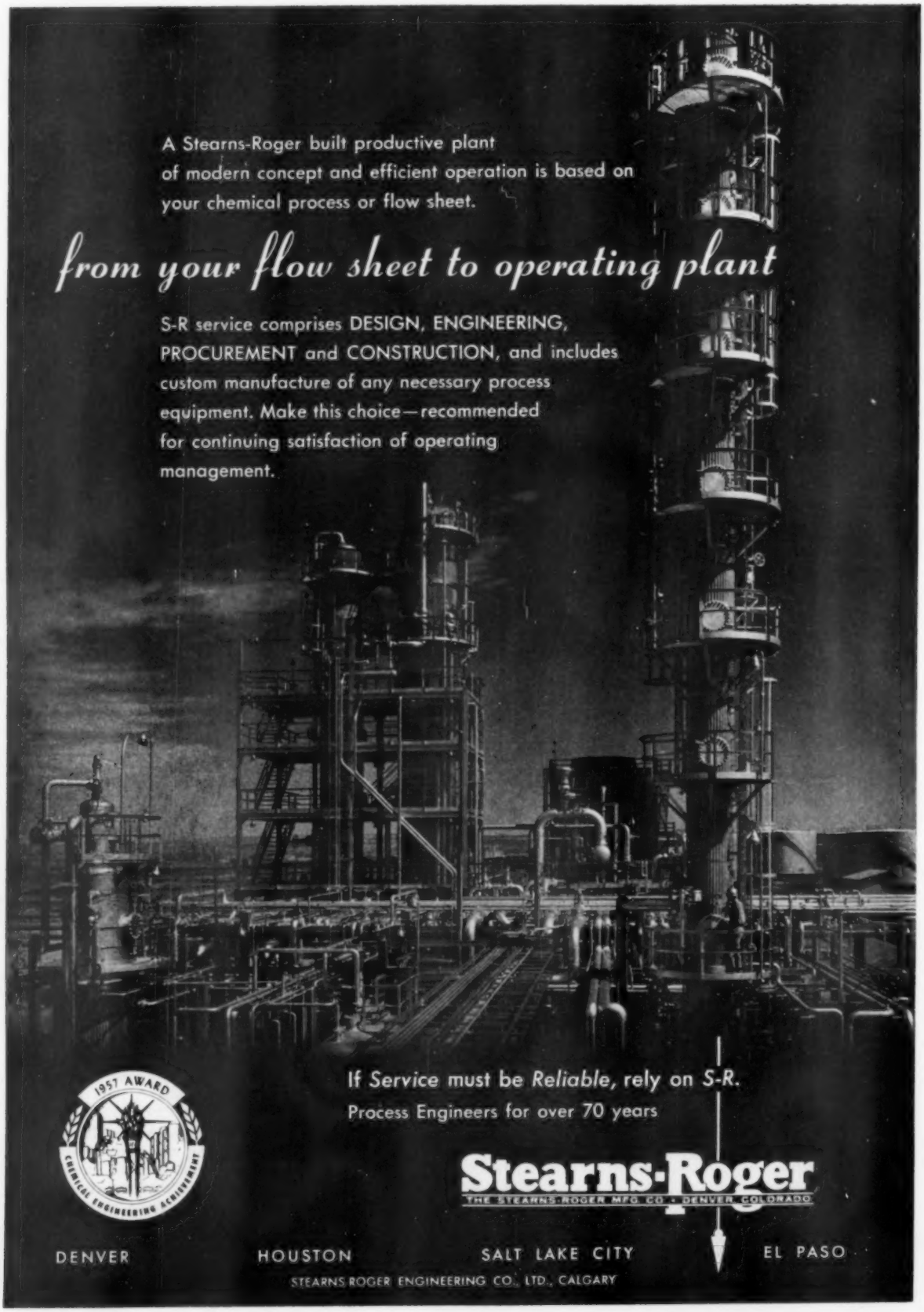
Discussion . . . When refinery offgases are used for fuel systems, an inherent problem is the fouling caused by chemical compounds carried in the gases. These include free sulfur, iron sulfide, and more recently, ammonium chloride and hydrochloric acid. Hydrochloric acid from the catalytic reforming unit offgas combines with ammonia in offgas from other units to give more ammonium chloride. The chemicals will foul pressure regulators, heater firing valves, and heater-burner orifice tips. Partial plugging of the burners tends to give uneven, unsatisfactory firing conditions. It also contributes to inefficient combustion with excess air passing into a heater. As a result of study, trials, and experience, Pure engineers came up with these suggestions to minimize fouling and its effects.

1. **Use water injection to combat ammonium chloride in cat reformer offgas . . .** Ammonium chloride in catalytic reformer offgas resulted in fouling of heater equipment at the unit and also contaminated the refinery fuel-gas system. The pressure regulators on the unit heaters and burner orifice tips were subject to fouling due to deposition of ammonium chloride crystals. Fouling was so prevalent that orifice tips on the heater burners had to be washed as often as 2-3-day intervals. Additionally, buildup of salts occurred in the line carrying offgas to the main refinery fuel-gas system.

Slugs of oil or water in this line would tend to carry high concentration of the salts on into the plant fuel system. Over a period of 2 weeks the chloride content as ammonium chloride in the total gas stream off the unit ranged from 3 to 13 lb. per day, with the average being on the high side of this spread.

A water-injection system was installed upstream of the regulators on the fuel-gas line to each heater. This allows easy washing of the regulators, the lines, and the burner orifices. A schedule of 5 minutes' water injection each day has been set up, which is enough to stop fouling due to ammonium chloride.

2. **Design fuel-gas takeoffs to minimize picking up contaminants . . .** Liquids in the fuel-gas stream, such as steam and hydrocarbon condensates, can contribute greatly to fouling in carrying contaminants into fuel-gas lines. While efforts are naturally always made to reduce the entry of these into the line, sometimes an upset condition puts a slug of liquid into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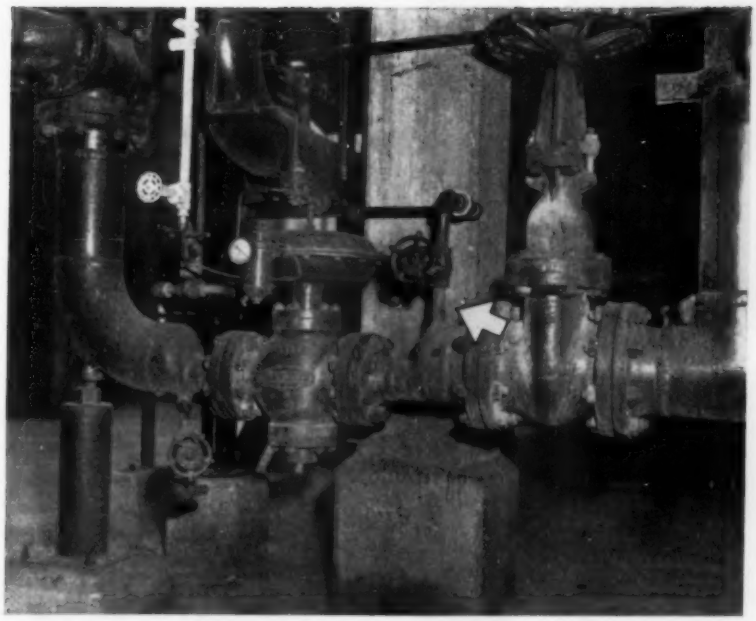
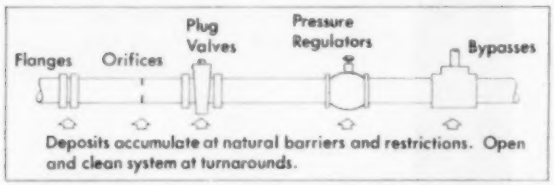


WATER-INJECTION SYSTEM provides for periodic washing of this gas regulator.

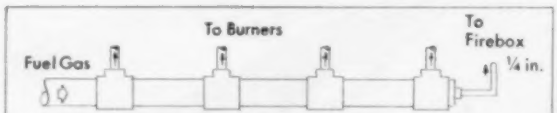
When a fuel line has been in service for some time, iron sulfide and free sulfur deposits tend to accumulate within the system. Pile-ups can occur at orifices, flanged connections, plug-type valves, at low points in the line and at bypass connections. In short, they accumulate wherever natural barriers create dams or restrictions. Fouling material in the fuel system will often take a path dictated by these barriers. Preventive maintenance will reduce future trouble in this regard. Hence, during shutdowns, fuel lines should be parted and washed.

These suggestions may help in other refinery fuel systems. Although the specific problems will not be identical, there are similar or allied situations which can be improved as a result of this study.

Acknowledgments . . . Cooperation of the management of Pure Oil Co. and assistance of N. S. Banta and C. A. Murray, Nederland, are gratefully acknowledged.



Deposits accumulate at natural barriers and restrictions. Open and clean system at turnarounds.

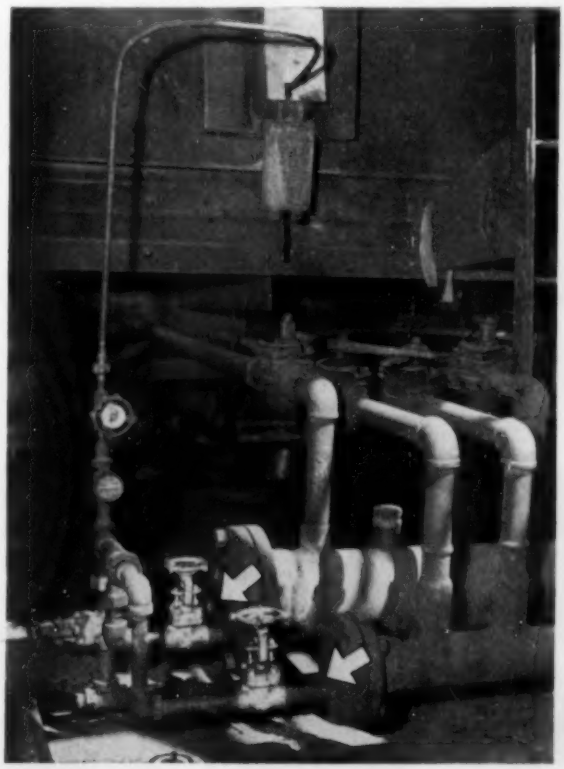


Contaminants accumulate at ends of headers. Install bleeder and discharge into fire box.

the fuel line. There are also liquids purposely introduced into the system —such as intermittent water injection. With this in mind, it is good engineering to design takeoffs, branch connections, and manifolds to minimize the effects of these liquids.

At heaters, where headers are used, there are individual takeoffs for fuel to a set of burners. Here, it will generally be found that fouling material will travel to the end of the header. As a result, the end set of burners will plug more often and more severely than the other burners since the contaminants are heavily concentrated at the end of the header.

A ¼-in. bleeder line can be used to dispose of this heavy concentration of contaminants. It should be connected to the bottom end of the header and then discharged directly into the heater through a partly open peephole or other suitable access. By having the discharge near a peephole, the operator has a rough but visible check as to conditions in the fuel system. If fouling is taking place, a check can be made to discover the source. Immediate corrective steps should be taken to avoid further and prolonged fouling.



CONTAMINANTS accumulate in headers where several burners are being fired. As shown, upper left, the system should be thoroughly cleaned at natural-barrier points during turnarounds. As shown upper and lower left, a bleeder installed at header end provides for removal of heavy materials at this point.

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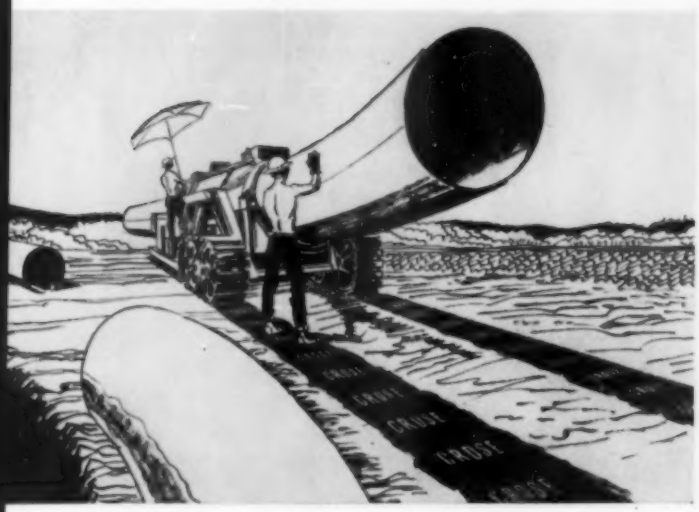

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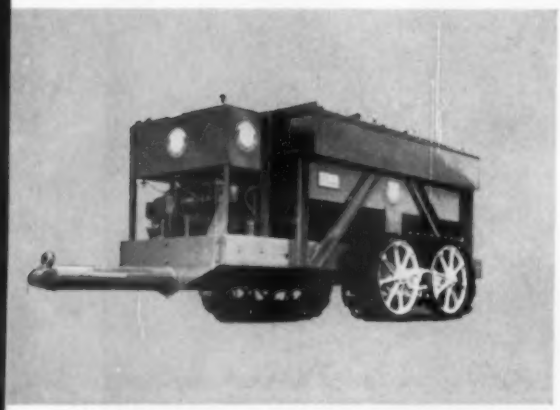

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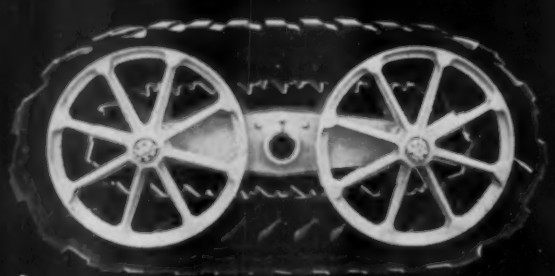

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Design requirements for valve operators

WITHIN MOST INDUSTRIES the valve-operator requirements vary greatly.

Design requirements for valve operators used in meter stations are unlike those of valve operators employed in compressor stations. Requirements for line valve operators are unlike either meter-station or compressor-station needs. Because of this wide diversity we shall consider valve-operator design requirements only as they apply to line valves.

Motive power . . . The energy stored in the transmission line provides the most feasible power supply. It is available at all line valves. Since a very small volume is needed to open or close a line valve, it's also inexpensive.

Most line-valve locations are such that to consider some other motive power, like bringing an electric supply to a remote location, is outside the realm of economics.

Stem stroke . . . The valve operator must have a capacity equal to the opening and the closing of line gate valves, or line plug valves. The largest gates until recently were 34 in., and the plugs, 30 in. Now, 40-in. ASA 900 gates are under consideration, and 30-in. ASA 600 round-opening plugs have been built.

Most manufacturers of valve controls have, however, built valve operators capable of 180-in. stroke. This latter is not uncommon in sluice-gate practice in hydroelectric plants, and similar structures.

Presented at AGA operating section meeting, New York City.

Requirements of valve operators

1. Operator should use line medium as power source.
2. Operator should be universal. It shall be adaptable to line gates or line plugs with variations limited to ratio of gearing controlling stroke.
3. Operator must be capable of maintaining position of valve, either closed or open. It shall not react to line pressure or unbalance within the line valve permitting it to creep open or creep closed.
4. Operator must have means to control its speed to insure valve life and minimize maintenance.
5. Operator must have auxiliary manual connection of positive mechanical type. Manual connection must not override power means.
6. Operator must be tamperproof.
7. Operator must be simple to maintain.
8. Operator must be suitable for use with automatic sensing and shutdown devices.

Capacity . . . The valve operator must be designed with capacity sufficient to open or to close the specified gate or plug valve. Suppose the valve operator is designed to operate the gate valve through the existing gear head of the valve, or to operate the plug valve through the existing gear head of the valve. Then the same operator can be used for either style of valve by making a minor change in the ratio of the gearing that controls the stroke of the valve.

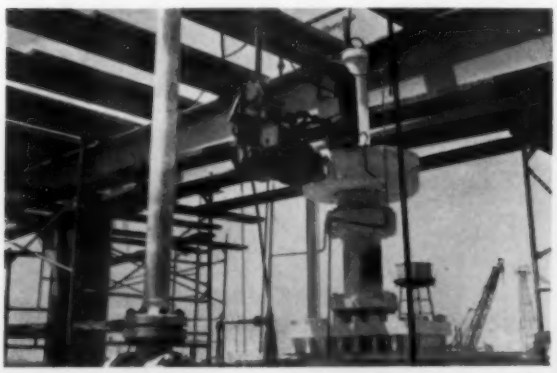
Thus, a universal operator is available. That is, the operator could be transferred from a 24-in. ASA 600-lb. gate to a 30-in. ASA 400-lb. plug. The gearing controlling the stem stroke could be changed out in about 30 minutes. Such a valve operator would drive the shaft of the gear head that would normally carry the handwheel.

BY J. N. MORRELL
President, E-I-M Co.

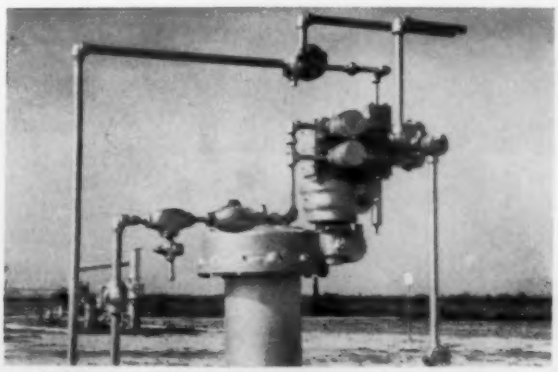
The operator output would be in excess of that torque developed through the handwheel of a manually operated valve.

Some operators in the case of gate valves would be top mounting. Here, however, the valve-operator capacity must be such that it will withstand the reaction due to the thrust required to close the valve tightly, or to break it free when trying to open the valve. By way of illustration, the normal 24-in. 600-lb. pipeline gate valve, with operating differential pressure across the valve of 960 psi., requires an output thrust of the valve operator equal to 120,000 lb., or approximately 60 tons.

This 60-ton load then must be con-



USED TO OPEN AND CLOSE a 24-in. main-line gate valve is this E-I-M G2 valve control.



MOUNTED on a 24-in. plug valve, this valve control is used as a station block valve.

NEW. . . . .

Five International crawlers—four with sidebooms—team up to make a creek crossing, with the 24-inch gas line that weighs 100 lbs per foot. Inset view—an International Superior backfiller covers the pipe.

The sled-mounted welding unit goes where it's needed without delay—behind the sure-treading 54 drawbar hp International TD-9. The spread has seven welding units on duty.

Planet-Powered "24" sideboom with 65-ton lift gives new pipe-handling speed and accuracy

—to H. L. Gentry Construction Co., Perrysburg, Ohio

Wherever there's an extra tough lift or "carry" situation to meet—especially where king-sized capacity and precision control save time—this new International Superior TD-24 sideboom gets the call. The job: laying the 24-inch Oneida-to-Phoenix, N. Y., line for Niagara Mohawk Power Corporation—that crosses one canal, one major river, creek after creek, 30 roads, and hills galore!

All made difficult by the pipeliner's nightmare: "wet season misery!"

With the tremendous lift of 130,000 lbs at 4-ft overhang, the new TD-24 also delivers a combination of load-control and traction advantages no other rig can give!

Exclusive, years-proved TD-24 Planet Power steering lets you feed full-time "live" power to both tracks—to turn smoothly fully loaded, without jerk or lurch. Load-limiting "dead-track drag" on turns is eliminated!

Exclusive, on-the-go TD-24 Hi-Lo shifting gives stall-preventing time-saving matching of speed to load. And exclusive fingertip hydraulic braking and foot decelerator regulate TD-24 motion for added control precision.

Exclusive mud-beating margin of flotation—with weight balanced over center track roller, and up to 18% less poundage psi on its tracks than other boom tractors, the TD-24 sideboom gets extra, full-flotation traction!

See how TD-24 Superior sideboom exclusive advantages increase pipe-handling capacity substantially—over all other king-sized rigs. Compare the new TD-24, and the other bonus-powered International Superior sidebooms for top pipe-handling value in their classes! Ask your International Superior Distributor to demonstrate the boom and tow equipment you need!

This new TD-24 Superior sideboom is work-leader of H. L. Gentry Construction Company's 22-unit International crawler fleet—operating near Phoenix, New York. "TD-24 sideboom weight-balance and load-handling capacity enable operator and crew to increase production," states James G. Mitchell, general superintendent.

International power units, including this one on a doper, are used to help the Gentry spread keep going! This new gas line will tie into New York State Natural Gas Line, at Oneida.

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tained in the antifriction bearings, housing, and cover of the valve operator. If the side-mounting operator, that is the type of operator that drives through the gear of the valve, is employed, then this operator need not incorporate in the design requirements thrust capacity. It need only to have torque capacity.

Closing time . . . There is no limitation on closing time, or should we say speed of operation. But, it should be remembered that the more rapidly a valve is closed, or opened, the less its life becomes, and the more maintenance costs increase. Gate valves, 36 in. in size, used in refining applications, have been closed in 5 seconds.

But, a thorough and rigid maintenance program must be employed, and each time the plant goes off stream a complete overhaul of the valves, and the valve operators, is standard procedure. This would hardly be applicable to pipeline valves, so the choice of closing time is one to be seriously considered.

Nominal closing time for a 24-in. 600-lb. gate of approximately 30 seconds provides efficient service with the very minimum of maintenance. But this time may vary between valve makes employing the same valve operator, because the stem characteristics, principally the lead of the valve stem and the ratio of the gear head, are not standardized.

Valve manufacturer "A" would, due to the stem characteristics and the gear-head ratio, have a closing time of 20 seconds. The same valve by manufacturer "B" might be 50 seconds. In the case of a 30-in. 600-lb. gate this time was 40 seconds with "A" manufacturer, 55 seconds with "B" manufacturer, and 90 seconds with "C" manufacturer. But the operator could be transferred from "A" to "B", or to "C", and perform in these given times.

Overtravel . . . The valve operator must incorporate means for stopping the valve in the exact open position, the exact closed position, or in any desired intermediate position. There is no permissible overtravel. If the valve port is to register with the pipe port for maximum efficiency, overtravel or undertravel cannot be tolerated.

Adaptability . . . All valve controls must be designed so that they can be applied to new valves in the valve-manufacturer's plant, or to existing valves in the field. In this latter case an adaptor plate may be used, or some similar connection, for mounting of the valve control.

Manual provision . . . A connection must be provided to permit manual operation of the valve through the valve control, when power is not available. This is normally at times of a new installation, or repair of a damaged line. Some users prefer to use a reservoir fed from the main line, so that power is available if there is no gas in the main line. This would be optional with the user.

However, the handwheel connection must be such that unauthorized personnel attempting to close a valve, or to open a valve, will find the power medium taking control away from them after the handwheel connection has been operated through three or four revolutions. If we have a closed valve, and some one should turn the handwheel connection about four times, this would then admit gas to the operator, and the valve would revert to the closed position.

The same would be true if the valve is set in the open position. Some companies have considered a clutching mechanism, but this isn't tamperproof. The operator could be declutched from its power source, controlled by handwheel, and perhaps left in an intermediate position or moved from its required position, causing operational problems. The handwheel connections should, then, be a positive mechanical connection that cannot override the power connection.

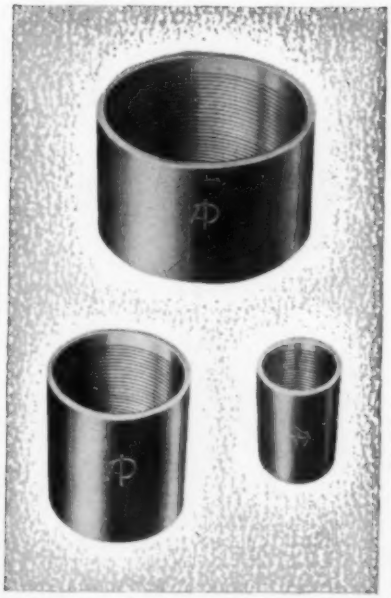
Maintenance . . . The valve operator should be simple, and rugged, in construction, with a minimum of parts. Means should be provided to protect operating parts during periods of rest. It is usual to recommend operation of a line valve at least one time monthly, to insure its satisfactory performance in event of an emergency.

Controls . . . Most line valves are manually controlled—that is manual manipulation of a cock admits gas to the valve operator to close the main valve, or to open it. But more and more valve operators are being equipped with automatic shutdown devices.

These function on rate of pressure drop or direction of flow. The valve operator should incorporate connections to receive such instruments to automatically close a main line gate or plug in the case of line damage.

Of extreme importance in valve-operator design is consideration to maintenance of the valve in its closed or open position. Operators have been built that permitted the valve to creep open. The line force against the closed valve was such that it tended to cause the valve to open.

There have been difficulties in the



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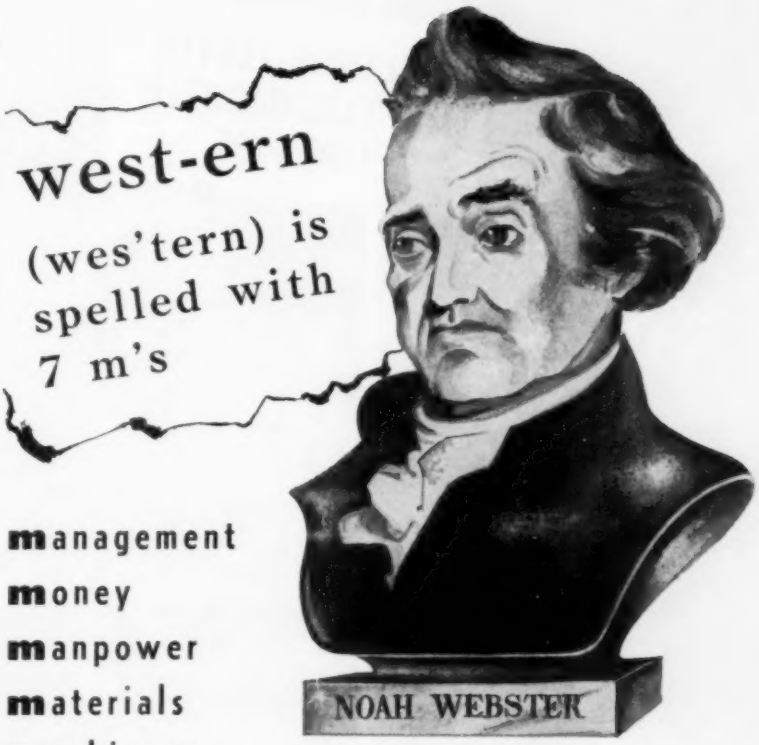

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methods
markets

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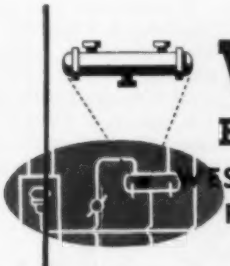

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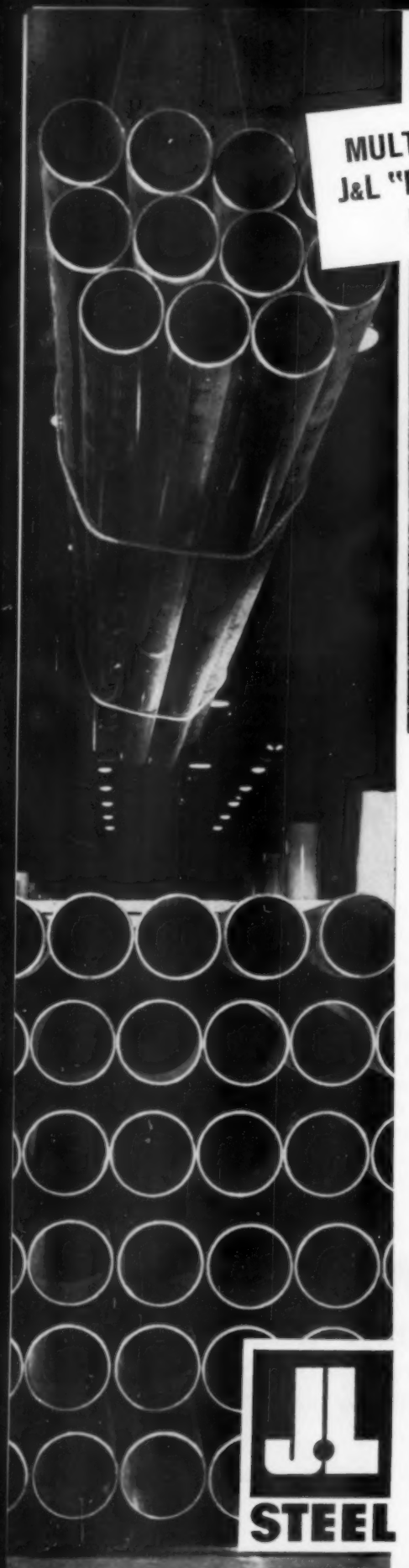

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J&L's 12¾-inch Electricweld line pipe was used in 22 miles of this Cherokee Pipe Line Company line.

"J&L Electricweld pipe bends readily to contours, is easy to weld"

. . . reports Pipe Line Service Company

Twenty-two miles of J&L's 12¾-inch O.D. Electricweld line pipe were installed by the Pipe Line Service Co., Seminole, Okla., in this line for the Cherokee Pipe Line Co.

"Our pipe must be uniformly round, bend readily to correct contour, and weld easily," says this pipeline contractor. "J&L pipe meets our specifications. It enabled us to avoid delays on this job over hilly terrain."

Electricweld line pipe is produced by Jones & Laughlin, an integrated steel company, under most rigid quality controls. Weld area of the steel is blasted with steel grit under 100 psi in a "Vacu-Blast" unit to clean the surface for perfect contact with the welding electrode.

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Electricweld pipe is available from 6⅝ inches through 12¾ inches and in lengths to 60 feet. Get the facts on this superior quality line pipe from your distributor, or write to Jones & Laughlin Steel Corporation, 3 Gateway Center, Pittsburgh 30, Pa.

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field due to this condition, and it should be kept in mind when considering the valve operator. Manually operated gate valves are always equipped with a screw and nut that do not overhaul. They maintain the valve in closed position or open position, or any desired intermediate position.

Plug valves are equipped with self-locking worm-gear heads that serve the same purpose. When these gear heads are removed, and cylinder operators of the linear type used on gates, or of the rotary type used on plugs, then a hydraulic-latching mechanism must be employed to maintain the valves in their requisite positions.

It follows that some medium must be used to latch and unlatch the hydraulic locks. A valve thus if not locked could creep closed, or could be pushed open due to the line pressure within the valve itself. Positive mechanical means should be used wherever possible to insure positive valve closure or positive valve opening.

Most valve-operator manufacturers try to keep their equipment bubble-tight. To do this they use mostly "O" rings, or similar sealing rings. But, all such rings are not permanently tight, and when employed in hydraulic systems could leave a valve in an intermediate position, rather than in the desired position.

But, those valve operators powered completely by the natural gas could blow all their rings, and still perform to the closed position or to the open position. There would be gas leakage, however, that could be corrected in due time by replacement of the damaged seal or rings.

Some thought should be given the dollar economics of the average installation. For instance, a 24-in. 600-lb. gate using a gas-expansion turbine-powered valve operator and the valve-gear head would cost approximately $1,600, a gas turbine of another type $1,750, and a cylinder operator making allowance for omission of the valve-gear head $2,400. A 24-in. 600-lb. plug valve would cost $1,600, $1,750 and $2,000, respectively.

Automatic shutdown devices of the rate-of-pressure-drop type cost about $600; and the flow type $500.

Primarily, the design requirements for pipeline valve operators should incorporate the above features, but there are many other detailed functions that must be considered that are applicable to a specific installation. There may be requirements in areas where ambient temperatures are extremely high or low that need special consideration.

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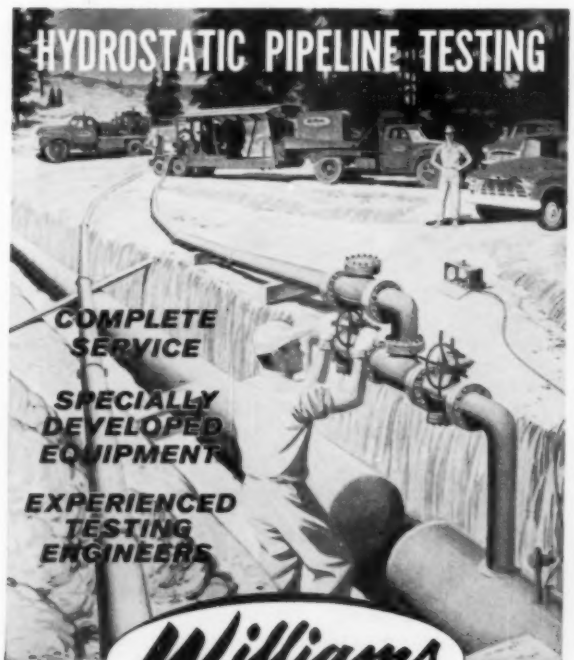

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FAST-DRILLING light rig used by Tulsa contractor in Oklahoma's Osage County operations. Pipe is stacked during one of rig's few fishing jobs.

Light rotary rig makes fast time

DRILLING OF 100 WELLS, totaling 250,000 ft. of hole, in a 3-year period is a record set by a small rotary rig operated by John Heard & Co., Tulsa contracting firm.

This represents an average for the period of 33⅓ wells per year, or about 2.8 wells per month. Most of the wells were in Osage County, Oklahoma, in areas where drilling depths ran 2,000 to 3,000 ft.

It was a National T-12 rig, powered by a Le-Roi H-844 V-8 engine on the hoist and the FE-12½ rotary. It used a C-150-B slush pump, separately powered by a Le-Roi H-2000 V-8 engine. Drilling was with 4½-in. pipe.

The record was possible by keeping down time at a minimum. The only major repair during the 3-year period was an overhaul of the draw-works clutch.

New rig for Alaska drilling

ASSEMBLY of a large new rig Coastal Drilling Co. expects to use in deep field-development drilling in Alaska is under way in this contractor's yards at Bakersfield, Calif.

Its expected operation will be on the Swanson River Unit on Kenai Peninsula, near Anchorage, on which Richfield Oil Co.'s oil-discovery well, drilled by Coastal, was brought in a year ago. Standard Oil Co. of California now is the operator on the unit.

The new rig, capable of drilling to depths below 14,000 ft., is an Emsco GB800 assembly, powered by two GMC 671 twin diesel engines and one "Quad." It has a Gardner-Denver FXL 20-in. pump, powered from the above engine compound, and an 850 Emsco pump with separate drive from two GMC 671 Quads.

Special consideration is being given in the assembly to minimization of weight and maximum portability to facilitate moves in field development.

Who's getting the drilling contracts

Gene Reid Drilling, Inc.'s first job after a year's suspension of operations (OGJ, Oct. 13, p. 83) is a 6,000-ft. well for Honolulu Oil Corp. in the new active Stevens pool play in Buena Vista Hills field, 6 miles north of Taft, in western Kern County, Cali-

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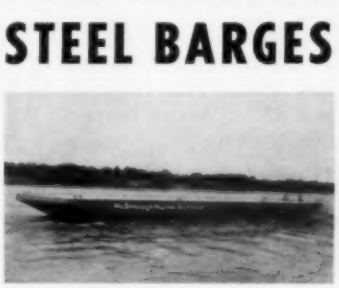

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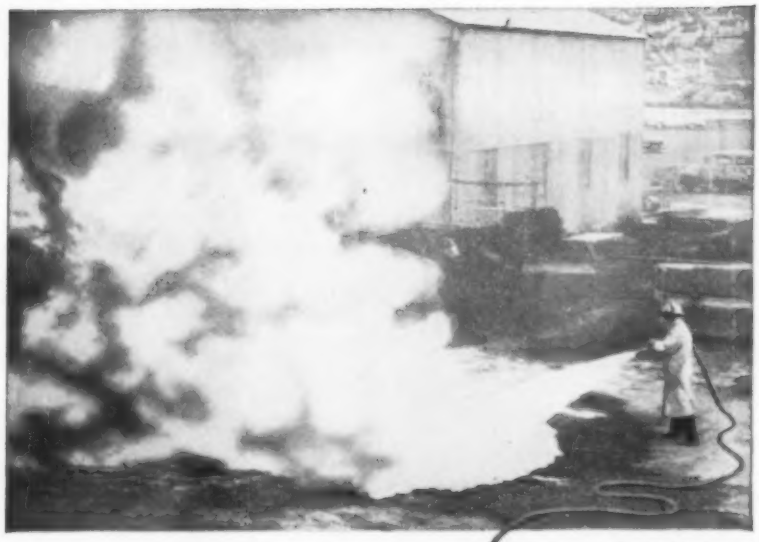

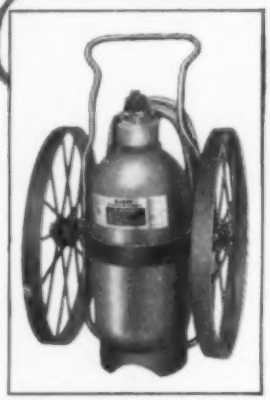

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One-Man Dry Chemical Kills More Fire Faster!

This new Kidde pressurized 200-pound extinguisher gets *more* fire-smothering dry chemical on a blaze *faster!* Its universal nozzle discharges a dense 40-foot stream that gives more efficient extinguishing action, greater heat protection for operator.

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fornia. It also is Honolulu's first well in this pool, opened by Tidewater Oil Co. nearly a year ago. Location at 10 Calidon, is a west extension of the area being developed by Tidewater, Richfield Oil Corp., and Standard Oil Co. of California.

Dixon Drilling Co., Abilene, Tex., has the contract on an exploratory well Jocelyn-Varn Oil Co., also of Abilene, is putting down 3 miles east of Winters, in northeastern Runnels County, West Central Texas. It is a Strawn test with a projected depth of 4,150 ft. Location, 1 Griffith, is 1¼ miles northeast of Nora-Strawn field.

Harris Drilling Co., Wichita Falls, Tex., has taken a 6,900-ft. drilling job on a wildcat location in southeastern Wise County, North Texas. Contract is with Wise-Kent Oil Co., Inc., operating from Wichita Falls. Location is on the operator's Askey - Man unit, 11 miles southeast of Decatur. It is 3 miles southeast of Boonsville Bend gas area.

Gulf Coast Drilling & Exploration, Inc., Laurel, Miss., is shifting from its regular field-development work at Baxterville, in Lamar County, South Mississippi, to put down a deeper-pay exploratory test. The contractor is drilling for Gulf Oil Corp., whose newest operation, 30 Andrew, is scheduled to go to 12,500 ft. with the Lower Cretaceous-Rodessa horizon as its probable objective. Most drilling in the field so far has been directed to Eutaw-Tuscaloosa (Upper Cretaceous) sands above 9,000 ft.

Fred Johnson Drilling Co., Long Beach, Calif., has a rig running on a newly started Union Oil Co.-Hancock Oil Co. wildcat 1½ miles southwest of Arvin, southeast of Bakersfield, in Kern County, California. Plans call for a 7,500 to 8,000-ft. test. Location is for 46-35 Tipton-Stockton, in 35-31-29. It is about a mile from production in Mountain View field.

Comet Drilling Co., Lafayette, La., has a new contract job in St. John the Baptist Parish, southeastern Louisiana. It is a 10,000-ft. test for Lamson & Bennett and Gulf Oil Corp., whose location at 1 San Francisco Planting & Manufacturing Co., in 23-11s-6e, is near the south shore of Lake Maurepas, and about 2 miles northeast of Reserve field. **Power Rig Co.,** also of Lafayette, has the only other rig running in this parish. It now is on a wildcat test F. A. Callery, Inc., is putting down about 3 miles southeast of Reserve field.

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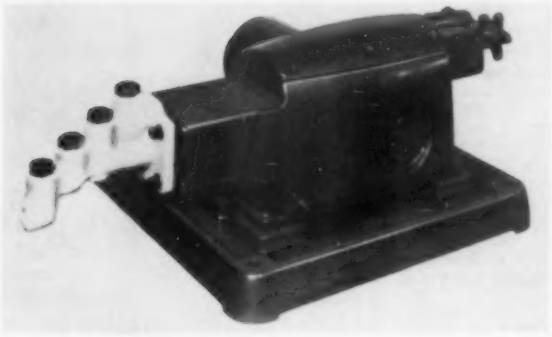
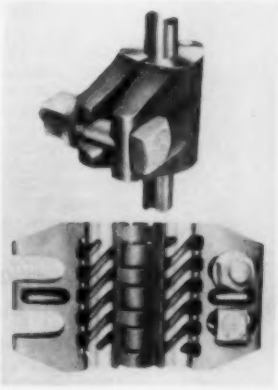
This week's SHOWCASE features . . .



Controlled-volume pump for metering

. . . of chemicals in process plants has alloy-steel liquid ends to take dirty or corrosive atmospheres. Maximum capacity ranges up to 29 gal. an hour. The pump will meter against pressures to 1,900 psi.

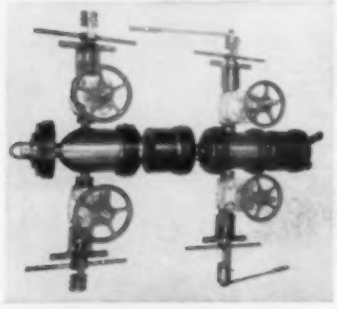
One feature of the Milroyal pump is its totally enclosed speed reducer which translates high-speed rotary motion into low-speed reciprocating motion. The reducer is an integral part of the pump and runs in an oil bath. It permits manual or automatic capacity adjustment from 0 to 100%. Capacity adjustment approximates a linear relationship and can be done while the pump operates. **Write or call: Milton Roy Co., 1300 East Mermaid Lane, Philadelphia 18, for details on Milroyal controlled-volume pumps.**



Polished-rod clamp grips tight

. . . and completely encircles the polished rod. Employing a spiral-grip design, the clamp body is made of high-tensile-strength, heat-treated AISI Type 1040 steel. The bolts, washers, and nuts are casehardened and cadmium-plated to give high strength and resistance to corrosion.

The clamp is machine-bored and reamed to close tolerances. Both ends are machine faced. The clamp is a full-opening type that allows fast, easy installation by one man. It comes in both one and two-bolt sizes. The one-bolt size handles polished-rod loads to 25,000 lb.; the two-bolt size to 40,000 lb. **Write or call: Crall Products, Inc., Pampa, Tex., for details on Spiral-Grip polished-rod clamps.**



Pipeline pig speeds line repair

. . . and construction. The new MKY P.G. pig is designed to plug and evacuate a line easily and quickly. It can also be useful as a floating valve on new construction.

To evacuate a line, place the pig in a scraper trap and weld seven collars onto the line—five upstream and two downstream of the section to be repaired.

The pig consists of two machines. The front one connects through a universal to a floating shaft in the head of the rear one. Gas introduced between the machines forces the front one downstream, evacuating the line. It is stopped by two shafts inserted through the two collars welded onto the line downstream.

Both machines have seals that are expanded to form plugs in the line. These allow line repair without loss of fluid. After repairs are completed, the pig sections are released and picked up at the next scraper trap. **Write or call: MKY Corp., 1603 South Phoenix, Tulsa, for details on P.G. Pig.**

Send this **Showcase Coupon**

to the **Manufacturer** of the item in which you are interested. See name, address, and equipment name and/or model, in bold-face type at end of description.

NAME AND/OR MODEL NUMBER.....

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MACCO "SPRING" FLUID OPERATED VALVE

("No Charge" Bellows)

In this type valve, with no bellows charge, the spring tension is set as the valve opening pressure. The bellows functions only as a diaphragm, and the spring functions as the total actuating force. When once a valve opening pressure is set by spring tension, the pressure remains unchanged regardless of hydrostatic pressure or temperature applied to the valve in the well. Since the spring in this valve is the total actuating force, the valve may be set with either extremely low or high opening pressure (100-3000 psi). On the "SPRING" fluid operated valve, the spring tension keeps the valve closed until a desired predetermined head of fluid has entered the tubing.

Macco "Spring" Fluid Operated Valves are manufactured in two sizes. The CM2-FS Valve is 1½" diameter for all normal installations. The CM-1FS Valve is 1" diameter and has wide application in dual, macaroni, and slim-hole lifting.

For further information regarding lifting with Macco Fluid Operated Valves, write for Brochure No. 3-12.

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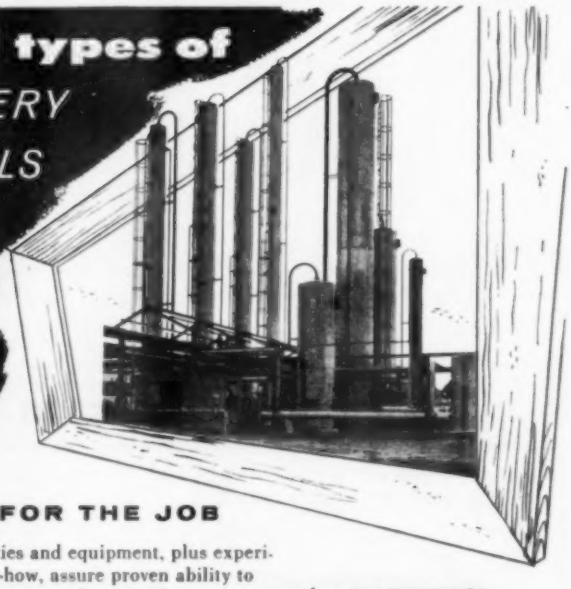

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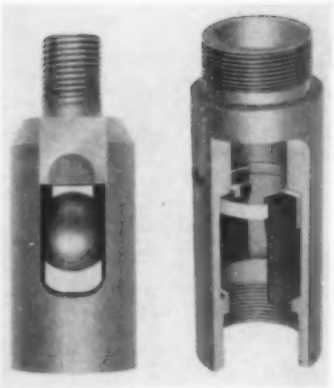


Rubber guide cage for pumps

. . . offers protection for the cage in situations where extreme or unusual ball impact may occur. Protection from impact is achieved in the open type of cage by a cross bar of the cage metal above the ball which serves as a backstop for the resilient ball stop.

The same protection is achieved in the closed type of cage, when needed, by optional ball guides having metal inserts in their upper portion. **Write or call: John N. Martin, Mfgr., 9 Brady Street, Tulsa, for details on rubber guide cage.**

•

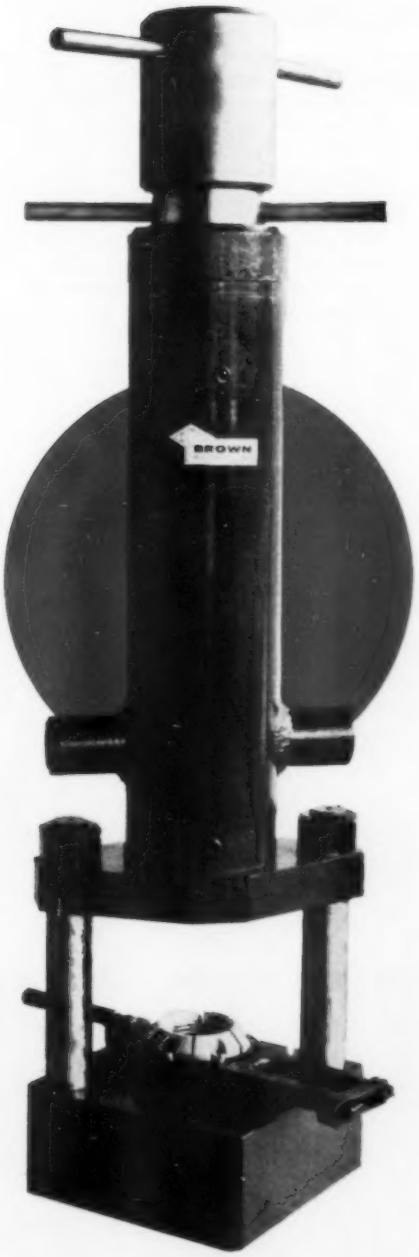
New crane boom provides safety

. . . from high-voltage electrical lines. It is designed to eliminate the hazards of cranes booming into such lines.

Called the Saf-T-boom, it is a protective shield fabricated of ¾ and 1-in. steel tubing and equipped with four 15-kv. insulators. According to the maker, the device will withstand a 5,000-lb. drop test, is weatherproofed, and laboratory-tested to over 30,000 volts without bypass or

Brown Introduces Tool For Well and Personnel Safety...

The TUBING BLEED-OFF ASSEMBLY



The Brown Tubing Bleed-Off Assembly was designed with one purpose in mind . . . to provide SAFE operations while pulling sanded-up or plugged tubing.

When pressure trapped between bridges makes normal tubing pulling operations unsafe, this device may be used to insure control of the well at all times. The Tubing Bleed-Off Assembly eliminates the possibility of damage to the well, rig or workover equipment, and the operating crews.

The advanced and outstanding features of this tool provide:

- Safety to operating personnel since the tubing cannot blow out of the hole
- Control of the well to prevent "blowouts"
- Controlled flow of fluid from the tubing
- Method of keeping rig floor clean when tubing unloads
- Means of directing produced fluid to storage area or facilities
- Rig safety since oil is not allowed to unload from tubing onto the motors
- A means of circulating the well to control it or kill it
- A means of accurately locating bridges by use of a pressure gauge and guesswork is eliminated

The assembly is basically a pressure-tight mud-box with seals which hold in both directions. Outlets are provided between the seals to allow for controlled "bleeding-off" of trapped pressure, and to allow for circulation back into the hole to "kill" the well.

The assembly is constructed with external upper seal and lower seal pack-off around the tubing to control trapped pressures when the tubing joint is broken between bridges. Two side outlets provide a means of connecting a pressure gauge, and, if desired, a flow line, between the seals.

The square bottom plate is designed to fit into the rotary table and is internally machined to accommodate standard tubing slips. A slip segment in the upper portion of the tool holds the tubing once the connection is broken and prevents the tubing from "blowing out of the hole." When the connection is broken, the upper portion of the tool, containing the upper seal, is free to rotate with the tubing. It is designed for either 2" or 2½" nominal tubing.

The Tubing Bleed-Off Assembly is another in the long list of "firsts" by Brown Oil Tools. Each tool manufactured or put in service by Brown is designed for maximum safety of the well, equipment and personnel. Additional information on this new tool can be obtained by contacting the nearest Brown representative. Or write Brown Oil Tools, Inc., P. O. Box 19236, Houston 24, Texas.

BOT

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OIL TOOLS, INC.

8490 Katy Road, Houston, Texas.

New Equipment

leakage. Ten inches of air space between the boom and the crane and penant lines prevent arcing from the cage to the crane, even in rain.

Only a few minutes are needed to install the boom. And it doesn't affect crane operation or the view of the operator. Two sizes are available. For cranes under 20 tons, the safety device weighs about 200 lb. and lists for $575. The device for 20-ton and larger cranes lists for $625 and weighs about 250 lb. **Write or call: Saf-T-Boom, Inc., 1613 Main Street, Little Rock, Ark., for details on safety device for cranes.**

•

Angle-globe valve rated at 6,000 psi.

. . . has a flip-up weatherproof housing for the stem and travel indicator. Other features of the PLMV valve for production use include the tee body and a Carboloy stem and seat to give high resistance to erosion. Available sizes are 1 and 2 in. **Write or call: Parkersburg Rig & Reel Co., 3327 Winthrop Avenue, Fort Worth, for details on PLMV valve.**

Automatic chemical analyzer

. . . gives continuous analysis and can detect trace materials down to parts per billion at an accuracy of 1%. The new analyzer offers the opportunity to automate each step of a chemical analysis, including measuring, mixing, purifying, processing, comparing, and recording.

Called the Technicon Autoanalyzer, it can run 20 to 60 tests an hour without human supervision. In the plant, the instrument can be hooked up to the process stream—either liquid or gas. The concentration level of any material or number of materials can then be continuously monitored and recorded. The control loop can be closed to automatically monitor steady-state control devices or otherwise regulate the process through on-stream continuous measurement. **Write or call: Technicon Controls, Inc., Chaucey, N. Y., for details on Autoanalyzer.**

Turbocharged 360-hp. diesel engine

. . . uses an exhaust-driven turbine to drive an air impeller which works with the engine blower to increase the fresh-air supply to the engine cylinder. The GM Series 110 engine is available with a base and radiator.

It was developed to power contractor's equipment and other portable or stationary equipment requiring a comparatively small, lightweight engine with a high power output. **Write or call: Detroit Diesel Engine Div., General Motors Corp., 13400 West Outer Drive, Detroit 28, for details on Series 110 diesel engine.**

REPUBLIC STEEL IS THE

Trencher for cross-country jobs

. . . digs to a 7½-ft. depth at widths from 36 to 52 in. The Parsons Model 420 Trenchliner offers three digging-wheel speeds—115, 215, and 300 ft. a minute. Digging speeds range from 15 in. to 25 ft. a minute.

Features include double-action hydraulic rams to actuate the wheel for roading and grading, and a reversible hydraulically driven, 36-in. wide conveyor belt that can be operated at 193, 378, or 621 ft. a minute.

Bucket widths possible with the trencher are 36, 42, and 48 in. Optional sidecutters increase trench width to 40, 46, and 52 in., respectively.

The trencher weighs about 42,000 lb. Powered by a 120-hp. engine, it travels at speeds from 1 to 2½ m.p.h.

Write or call: Parsons Co., P. O. Box 431, Newton, Iowa, for details on Model 420 trencher.

•

Waterproof joint sealer expands

. . . or contracts. Yet it forms a permanent, weathertight seal for cracks and joints in concrete, brick, metal, wood, or most other building materials presently used.

Called Stonlast, the product is a synthetic-rubber compound which contains no oils. It does not oxidize and become brittle. It does not deteriorate in the presence of most corrosive vapors, the maker claims.

Stonlast comes as a two-component package containing a base resin and a curing agent. They are combined at the job site. The mixture stays workable for about 2½ to 3½ hours at 75° F. It cures in about 33 to 39 hours. **Write or call: Stonhard Co., Inc., Dept. 123, 1306 Spring Garden Street, Philadelphia 23, for details on Stonlast.**

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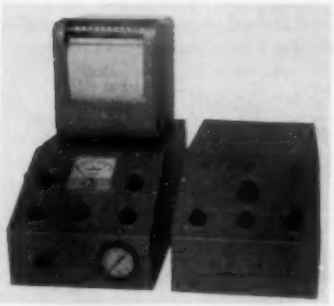


Gas analyzer monitors drilling mud

. . . and records the data on a strip chart. The chromatograph type of analyzer has an automatic sampling valve with a 10 cc. capacity which allows monitoring of drilling mud for methane every 30 seconds.

The operator can switch the

FASTEST GROWING MAJOR

Chromonitor analyzer from a 30-second cycle to a 5-minute cycle if desired. Within 4 minutes, the instrument readily and accurately identifies each gas present in the sample through the butane series. An identification overlay comes with the instrument to aid identification of components.

Air is used as a carrier. The thermal-conductivity cell is a thermistor type. Dry-cell batteries power the instrument. **Write or call: Well Logging Equipment Mfg. Co., 1920 Hussion Street, Houston, for details on Chromonitor gas analyzer.**

●

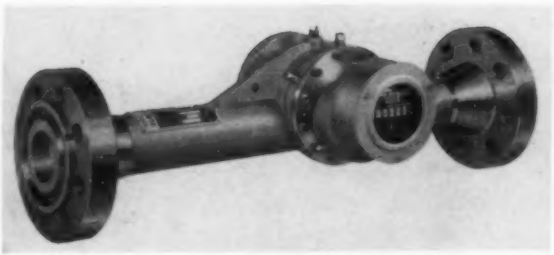
Hydrocarbon-phase equilibrium data

. . . on punched cards are now available. The data are expected to prove particularly valuable to design and process engineers. They can use the cards in computers to quickly solve complex, time-consuming problems.

Punched on cards for an IBM computer, the data were taken from 130 K-charts contained in the NGAA Equilibrium Ratio Data Book, Second Edition, 1957. The book presents data for 12 compounds (methane through decane) over a range of convergence pressures from 600 to 20,000 psia. and a temperature range from 500° to as low as —260° F.

Two different sets of the cards are available—the "point" set and the "coefficient" set. The point set consists of 17,300 cards carrying a total of 69,200 points from the NGAA charts. Each card has four punched points. They are identified on the card by component, convergence pressure, temperature, and pressure.

The coefficient set consists of 432 cards with seven coefficients per card. List price for both sets of cards plus a flow sheet for machine solution, a computer program, sample calculations, and suggestions for simpler methods when K-data are needed for limited ranges is $400. The coefficient set plus the supplementary material lists for $300, and the point set lists for $200. Any of the available forms can be obtained on magnetic tape too. **Write or call: Natural Gasoline Association of America, 421 Kennedy Building, Tulsa 3, for details on punched-card K-data.**

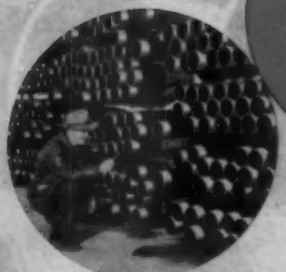


New gas meter handles 10 M.M.c.f.d.

. . . at 1,000 psig. and is accurate to 0.5% of indicated reading, the maker reports. Based on a vortex-velocity principle of flow measurement, the flowmeter is self-contained, nonelectrical, and constructed of stainless steel for a 1,500-psi. working pressure. Capable of handling a variety of gases, the meter is linear in operation and has a low pressure drop.

The meter requires no auxiliary equipment. It measures 16 in. long, is fitted with 2-in. flanges, and weighs 43 lb. **Write or call: Rotron Controls Corp., Woodstock, N. Y., for Bulletin CM-12.**

...IN CASING AND TUBING BECAUSE...



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Republic people know the oil industry and its equipment problems as well as they know steel. We've been working on them for half a century.

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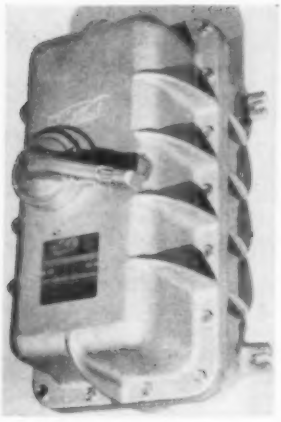
Republic's reputation for furnishing quality products shipment-after-shipment, year-in, year-out has been solidly built.



Explosionproof circuit breakers

. . . made of cast aluminum are compact and lightweight. They are designed for Class I, Groups C and D; and Class II, Groups E, F, and G locations. Units are U.L.-C.S.A. approved.

The XCB Series is designed for breakers in frame sizes E, EM, F, J, K, KL, and LM. The XPCB Series is designed to take up to four single-pole quick-lag breakers, two double-pole, or a single three-pole. Each series is furnished with mounting lugs and an easy-action handle for smooth, positive operation. **Write or call: Killark Electric Mfg. Co., Vandeventer and Easton, St. Louis 13, for details on new circuit breakers.**

●

Junk-mill design improved

. . . by addition of four wear strips on the body of the tool. The new feature on the Servco junk mill prevents damage to the casing string during milling operations.

Also, the cutting blades have been strengthened with heavier webs of hard-facing material. The junk mill has found wide use for milling up rock bits, reamer blades, hard-faced tool joints, and for other clean-out jobs. **Write or call: Servco, 4850 Gasmer Street, Houston 35, for details on junk mills.**

Axial compressor capacity adjusts

. . . while machine operates. This new feature on the AC axial compressor is expected to prove valuable in petrochemical plants as it offers a chance for savings on installation and operation.

Capacity adjustment during operation is achieved through the use of adjustable inlet guide vanes and full or partial stator-blade control. These features still allow the compressor to retain high inherent efficiency, and part-load pressure rise, the maker says. The compressor is expected to be ideal for applications where a variable-speed drive is too expensive, impractical, or will not give the required capacity range variation.

Control of the range-extension devices can be accomplished in several ways. A simple method consists of a handwheel mounted on the compressor. Another method uses hydraulic cylinders or electric-motor actuators. **Write or call: Allis-Chalmers Mfg. Co., 1126 South Seventieth Street, Milwaukee 1, for details on Adjustable-capacity axial compressors.**

●

Foaming agent aids air drilling

. . . when water is produced. The product, called Synfoam No. 1, is a surfactant that forms tough, stable bubbles which resist the ordinarily destructive effects of salts, clay, and other contaminants present in an air or gas stream. It serves to decrease the pressure and volume requirements.

The product is mixed with water and pumped into the air or gas line on the high-pressure side. Tests show it to be valuable in removing mud

3. UNIFORMITY

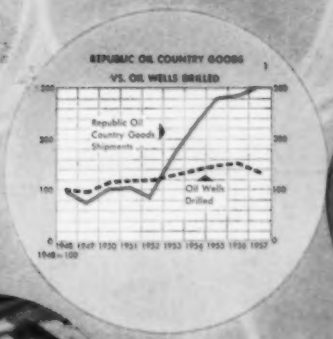
Protection of your investment is uniform in every joint of Republic Casing and Tubing. Uniform wall thickness. Uniform roundness and high yield strength.

4. DEPENDABILITY

Whatever the depth, you can count on the dependability of Republic products throughout every joint in the string.

5. FACILITIES

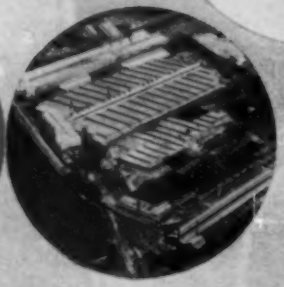
Republic Casing and Tubing are made by skilled craftsmen using the very latest in precision equipment.



To meet your need for oil country tubular goods, Republic has tripled Casing and Tubing production in the past ten years. Seamless and welded. On-schedule delivery from strategically located field stocks. Specify "Republic".

6. RESOURCES

Republic is a completely integrated steel and steel products manufacturer. Republic controls every step, assures uniform quality on a mass-production basis.



REPUBLIC STEEL

CLEVELAND, OHIO

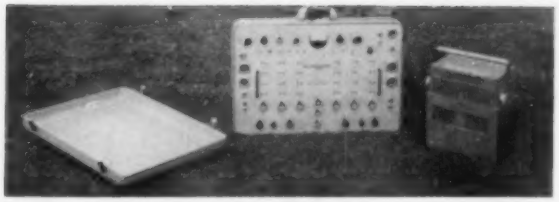
rings which cause excessive drag on the pipe and reduce gas flow, and for removing wet cuttings while drilling. Among its other uses, it may also be valuable for removing cuttings when the air or gas velocity is too low for normal air or gas drilling. **Write or call: Swift & Co., Soap Department, Union Stock Yards, Chicago 9, for details on Synfoam No. 1.**

•

Microwave amplifier widens repeaters

. . . by increasing power output of the main transmitter in a microwave system to as high as 80 watts. The amplifier is part of a new power package now available. The 2,000-mc. package includes the power amplifier, power supply, cables, and other equipment necessary to increase the power output.

In many instances, distances of over 100 miles may be obtainable. The power amplifier is expected to be especially beneficial where mountainous terrain in involved. The result can be considerable savings in total costs through a reduction in the number of repeater stations needed. **Write or call: International General Electric Co., 1 River Road, Schenectady 5, N. Y., for details on 2,000-mc. microwave power package.**



Transistorized seismic amplifier

. . . now available provides savings in weight and size of 50 to 80% over conventional vacuum-tube systems. Called Explorer, the Model 8000 seismograph is a 24-channel unit, complete with control and test circuits. It is contained in a portable, waterproof case and weighs only 57 lb.

System power is supplied by a transistorized power supply and a 12-volt aircraft battery. These are housed in another portable case weighing only

Frequency response range is from 5 to 200 c.p.s. Dynamic range is 100 decibels. The seismograph can be used with any seismic camera or magnetic recorder. Two outputs are provided. Output level can be increased to seven times normal before signal clipping occurs. **Write or call: Texas Instruments, Inc., P. O. Box 6027, Houston 6, for details on Explorer seismograph.**

Polished-rod packing for Hercules

. . . stuffing boxes now available in an improved design. The improved packing has a long service life and will not harden or burn during pump-off, according to the maker. And it will not pit, wear, or score moving parts. Also, the packing resists salt or sulfurous water.

Complete or partial sets of the stuffing-box packing are available in sizes of 1⅛ through 1¾ in. The packing is a semimetallic type composed of a special antifriction alloy combined with strands of a resilient fiber for body and spring. **Write or call: Axelson Mfg. Co., Div. of U. S. Industries, Inc., 6160 South Boyle Avenue, Los Angeles 58, for details on Marlo packing for Hercules stuffing boxes.**

REPUBLIC STEEL....

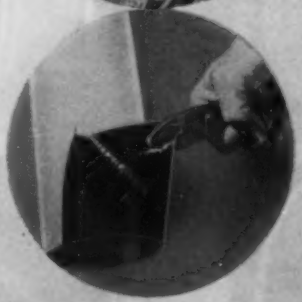
Serves all segments of the Oil Industry!

With CONTINUOUS BUTTWELD PIPE

Uniform strength and ductility, tight galvanized coating, ease of threading, bending, and welding, make it ideal for gathering and distribution lines and general maintenance work. Available in economical double-random lengths, in sizes from ⅛" through 4" nominal. Call your distributor for quick delivery of Republic Steel Pipe; send coupon for data.

With ALLOY STUDS

Made to withstand the tremendous high stresses imposed on a wide variety of oil field equipment, such as the blowout preventer shown here. Resistant to corrosion. Precision-made of toughest alloy steel. Clean, accurate threads provide high strength and wear resistance together with ease of assembly and disassembly for maintenance. Republic makes fasteners for every oil industry application. Send coupon for facts.



With NEW PLASTIC-COATED PIPE AND TUBING

Republic X-TRU-COAT combines the corrosion resistance of plastic with the strength of steel. Use it wherever external corrosive conditions exist. The bright yellow plastic is factory applied, no field wrapping or coating needed. Ask your distributor for Republic's "bright yellow" pipe; send coupon for specifications.

REPUBLIC STEEL CORPORATION
Dept. OG-6314
1441 Republic Building · Cleveland 1, Ohio

Please send more information on:

☐ Casing and Tubing ☐ Alloy Studs
☐ Buttweld Pipe ☐ X-TRU-COAT

Name _____ Title _____

Company _____

Address _____

City _____ Zone ____ State _____

SHOWCASE . . .

New Literature

Stainless-steel-body valves

. . . are described in two new bulletins now obtainable. The Grove Series T (seat-seal) and Series N (needle) valves have wide use where ease of operation and bubbletight shutoff are essential. The Series N valves are offered for maximum operating pressures of 6,000 psi. and the Series T valves for a maximum of 3,000 psi. Both series are available for standard operating temperatures of —30° to plus 150° F., with ¼, ⅜, or ½-in. female NPT connections. Special Series T and N valves can be obtained with an operating temperature range of —65° to 165° F. Bulletins include dimension drawings and tables for globe and angle patterns and tri-port and cross-over designs of both series. **Write or call: Grove Valve & Regulator Co., 6599 Hollis Street, Oakland 8, Calif., for Bulletin 3500-TR-1, and Bulletin 3500-NR-1.**

Pipeline rotary drill unit

. . . is self-propelled and fast, as outlined in a new four-page brochure. Tagged the Blastholer, the unit drills from four to eight times as many holes per hour as other equipment for continuous blasting on pipeline projects, the maker reports. Only one operator is needed. The unit drills holes from 2¼ to 3⅞ in. with variable rotary speeds from 25 to 325 r.p.m. and constant - controlled down - pressure. Blastholer will cut about 80% of rock and soil formations, according to the maker. **Write or call: Drilling Accessory & Mfg. Co., Inc., P.O. Box 5768, Dallas, for Pipeline Blastholer Bulletin.**

Screen pipe for wells

. . . including oil, gas, and water wells, is presented in a new eight-page catalog. The catalog covers vertical-slotted and drilled-hole wire-wrapped screen, ribbed - type wire - wrapped screen, and prepacked gravel-pack screen. It gives you specifications on each of the types to simplify ordering. **Write or call: Emsco Screen Pipe Co., P. O. Box 14446, Houston 21, for catalog 58-59.**

New electronics catalog has 452 pages

. . . and is the biggest such product source published by any electronics supply house. Special emphasis has been placed on equipment for industrial maintenance, research, and production requirements. There are detailed listings of standard and special-purpose electronic tubes, transistors, semiconductors, and diodes, test instruments, voltage stabilizers, transformers, resistors, capacitors, printed-circuit components, rheostats, relays, and switches. Other listings include rectifiers, fuses, tools, wire, cable, photo-electric components, two-way radio-telephones, sound-powered telephones, counters, program clocks, timers, batteries, sockets, generators, and power supplies. **Write or call: Allied Radio Corp., 100 North Western Avenue, Chicago 80, for 1959 Electronics Catalog.**

Foaming agent controls water

. . . influx encountered during air drilling, as described in a new eight-page folder. The booklet outlines case histories of some 200 wells drilled with air or other gas during the past year. The agent—tradenamed Afrox—is injected on the surface. Water mixes with it on bottom by air circulation. Afrox turns the water influx into aerated foam in which cuttings are dispersed and suspended. Then the light column of Afrox foam can be easily lifted out of the hole by natural air pressure, the maker claims, and

METAL TRANSFERS HEAT MORE THAN 50,000% BETTER THAN AIR!

In mechanical bond finned tubes an air gap is always present between the fin and the tube which greatly reduces efficiency. Heat expansion loosens this bond and creates an even larger air gap which further retards heat transfer.

Air gaps are avoided in Smithco Air Cooled Heat Exchangers by employing metal as the bonding agent. This metal bond provides a smooth, unbroken flow of heat from tube to fin. Smithco *Metalbond* also protects against corrosion and has proven to be the most permanent bond yet devised.

☆ It's a SMITHCO . . . Your Guarantee of Quality

SMITHCO Engineering Inc.

P. O. BOX 3217
TULSA, OKLAHOMA

grooved pipe connections ?
name the application —
has the coupling
GUSTIN gb BACON
GRUVAGRIP®
Made of rugged malleable iron, Gruvagrip is an easily-installed, reusable coupling for grooved pipe with working pressures up to 1,000 p.s.i. Maintains air-tight connection under misalignment up to 7°. Absorbs shock, vibration, ground motion, expansion and contraction.
GRUVAJOINT
Gruvajoint's low-cost companion for pipe with working pressure up to 500 p.s.i. Air, gases, water, oils, chemicals, processing fluids, pulverized minerals . . . G-B couplings are built for use with pipe carrying virtually any type of liquid or material.
RIGI-GRIP
The NEW G-B coupling for grooved pipe applications where complete rigidity of connection is desired. Rigi-Grip also is designed for pipe with working pressures up to 2,000 p.s.i. Ideal for tank battery hookups, LACT units, production headers and complete waterflood piping systems.
AND, G-B OFFERS YOU A COMPLETE, COMPANION LINE OF DEPENDABLE, FREE-FLOWING FITTINGS
G-B COUPLING PRODUCTS ARE AVAILABLE AT LEADING SUPPLY STORES EVERYWHERE
GUSTIN-BACON Manufacturing Company
210 W. 10th St. Kansas City, Mo.

air drilling continues as before. **Write or call: Aquaness Dept., Atlas Power Co., Wilmington, Del., for Afrox foaming-agent catalog.**

Packaged Dowell products

. . . are featured in a new and informative 16-page catalog. Products covered include corrosion inhibitors, solids-settling agents, lost-circulation material, paraffin-removal and water-block-removal agents, acid inhibitors, liquid plastics, and mud-dispersing and gyp-retarding agents. Glossy photos and charts throughout the catalog show you product properties and application data. **Write or call: Dowell division of The Dow Chemical Co., P. O. Box 536, Tulsa, for catalog of products.**

Rotary drum filter units

. . . and their component parts are discussed in a new 24-page, two-color brochure. Five principal types of rotary drum filter units—panel, wire-wound, internal-drum, precoat, and top-feed filters—are described, along with some 50 photos and line and wash drawings of various filters and components. Tables of sizes and capacities of each design are also included. **Write or call: Dorr-Oliver, Inc., Barry Place, Stamford, Conn., for Bulletin 7200.**

Block insulation brochure

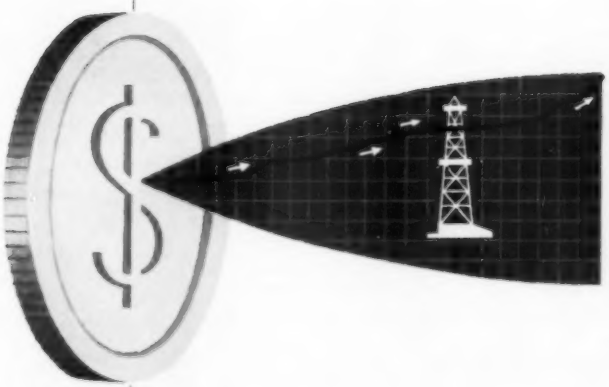
. . . gives you details on Abosite, an amosite asbestos-base block insulation recently introduced. The brochure (eight pages) details the insulation's thermal efficiency, expansion qualities, and available sizes. It includes for fast selection a table of thickness for temperature differences from 200° to 1,200° F. and list prices for thicknesses from 1 through 4 in. The insulation comes in two types to withstand temperatures to 1,000° and 1,800° F., respectively. **Write or call: Aber Co., Inc., P. O. Box 2535, Houston, for eight-page brochure on Abosite.**

Temperature programing

. . . in gas-vapor chromatography is discussed in new Bulletin 838. The eight-page bulletin, packed with tables and curves, answers questions about column temperature, retention time, detector temperature, resolution, and temperature programing. A graphic comparison of two curves, one of a constant-temperature analysis and the other a programed analysis with identical samples, shows time saved and improved accuracy under proper temperature programing. **Write or call: Burrell Corp., 2223 Fifth Avenue, Pittsburgh 19, for Bulletin 838.**

profitable well stimulation results...

HALLIBURTON VIS-O-FRAC



"Problem Wells" may also be fractured for profitable production with Halliburton Vis-O-Frac.

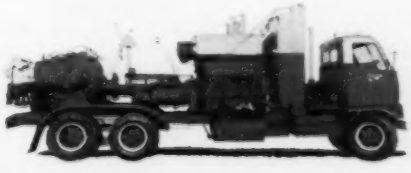
The properties of VIS-O-FRAC make it highly effective for fracturing over a wide range of depth and well conditions. Even at elevated temperatures, viscosity changes are minor, helping to provide successful fracturing of deeper wells.

✓ *CHECK-LIST FOR VIS-O-FRAC ...TO HELP BENEFIT YOUR WELL*

- ✓ **Economical**
- ✓ **Low Friction Loss**
- ✓ **Good Sand Carrying Ability**
- ✓ **Compatible With Crudes**
- ✓ **Use of Lease Oil**
- ✓ **Low Fluid Loss**
- ✓ **Good Viscosity Index**
- ✓ **Continuous Preparation**
- ✓ **Ease of Viscosity Reduction**

✓✓ Check with the Halliburton Representative in your area for the details.

FIRST AND FOREMOST IN FORMATION FRACTURING



HALLIBURTON FRACTURING SERVICES

HALLIBURTON OIL WELL CEMENTING COMPANY • DUNCAN, OKLAHOMA

FOR RESEARCH AND RESULTS IN FORMATION FRACTURING

EQUIPMENT MEN

Cooper-Bessemer Corp. boosts

P. S. Hurst

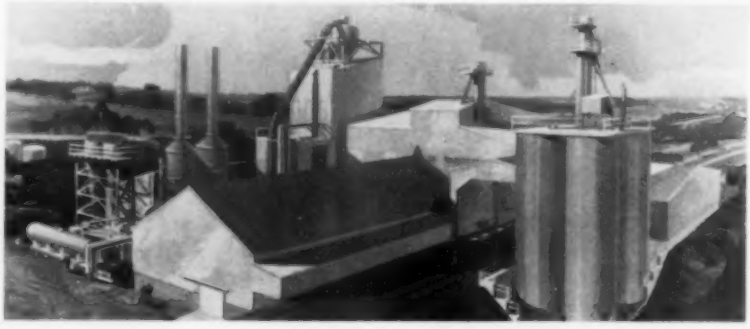
. . . Phil S. Hurst to the post of assistant product manager, gas engine compressor sales, according to Grant C. Woodard, general sales manager. In his new capacity, Hurst will assist Don Reed, product manager, gas engine compressors. Hurst was in Cooper-Bessemer's sales engineering section.

Tretolite Co. announces

. . . recent additions and transfers. J. R. Smith, formerly corrosion engineer for Dowell division of The Dow Chemical Co., has joined Tretolite in the same capacity in the South Louisiana district. He will locate at Lafayette, La. Ed L. Dressel, head of the field service laboratory at Odessa, Tex., transfers to the sales department as a corrosion engineer for the West Central division. He replaces M. C. Deodati, Jr., who has transferred to the southern division at Houston. R. W. Taylor, technician in the St. Louis laboratory, has been named junior testing engineer and will replace Dressel at Odessa.

Houston firm enters

. . . rubber molding field. Rubber Applicators, Inc., a division of Plastic Applicators, Inc., has announced the installation of extensive plastic and rubber molding equipment at its 5-acre manufacturing site in Houston. Molding facilities are under the technical direction of Jack D. McComic. Facilities are available for testing finished products for the oil industry under pressures up to 10,000 psi. and temperatures up to 600° F.



Acid-activated clay adsorbents added by The Milwhite Co.

. . . to its line of industrial adsorbents. The picture is a wash-rendition of an acid-activation plant now being erected by M. W. Kellogg Co. for Morton Chemical Co. of Chicago. Milwhite has contracted with Morton for the latter to manufacture the adsorbents by a Milwhite process and from reserves of Montmorillonite clays stockpiled by Milwhite. The unit is being constructed adjacent to Morton's acid plant at Weeks Island, La.

Joseph F. Santilli, Jr., named

. . . manager of the marketing services section of Atlas Powder Co.'s Aquaness department in Houston. In his new capacity he will be responsible for advertising, sales promotion, and sales administration work for Aquaness, which markets Altas' chemicals used by the petroleum industry.

B-I-F Industries, Inc., opens

. . . a new regional sales office in Baton Rouge, La. The office will be headed by Lewis H. Johnson, Jr., and will handle products of B-I-F Industries and its three divisions, Builders-Providence, Inc.; Proportioneers, Inc.; and Omega Machine Co.

Alberta Oil Tool to make

. . . precision oil-field fittings, according to E. M. Blanchard, president. At the same time he stated that Borneo Co. Ltd., London, has acquired a major interest in the Edmonton firm. C. C. Cousins of Borneo was elected a director and appointed secretary-treasurer of Alberta Oil Tool. Existing management and policies of the company will remain unchanged.

H. G. Bell joins

. . . Le Grand Rochester, Ltd. He will be based in Baghdad and will be concerned with the sales of the company's oil-field equipment in the Middle East. He formerly was with Iraq Petroleum Co. as drilling superintendent.

BSF&D appointed

. . . as advertising and merchandising counsel for Federal-Mogul Service Division of Federal-Mogul-Bower Bearings, Inc., according to T. L. Camp, vice president and general manager. The move to Brooke, Smith, French & Dorrance, Inc., consolidates the national advertising and merchandising efforts of the service division with one agency.

G. S. Younkin named

. . . to take over active direction of the sales activities of Minneapolis-Honeywell Regulator Co.'s Datamatic division, according to Paul B. Wishart, president. Younkin is vice president and general sales manager of the company.

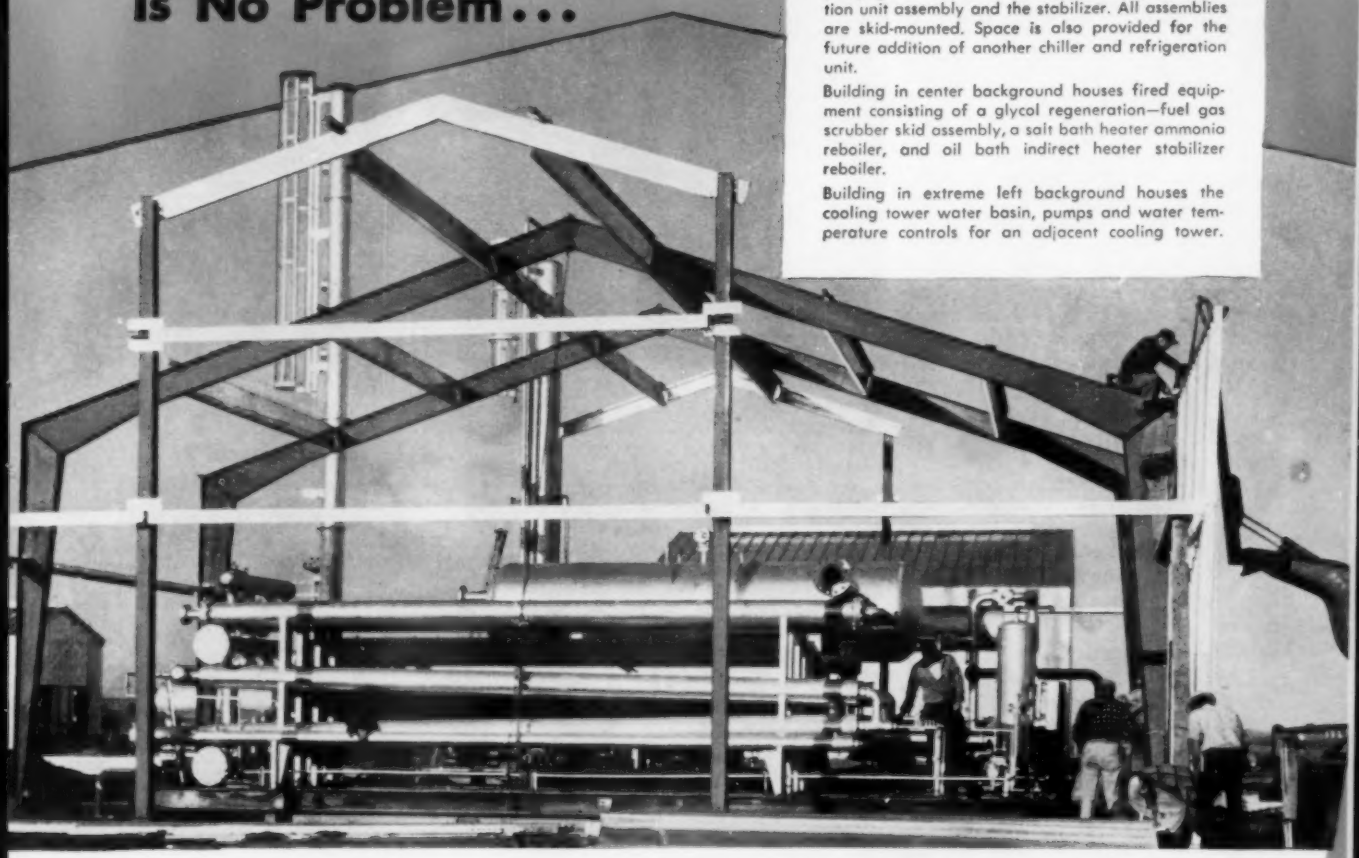
Hyman-Michaels Co. forms

. . . Michaels International Corp., according to E. B. Michaels, president of Hyman-Michaels. Operations in New York will be in charge of vice

Wyatt Metal & Boiler Works, Inc., now occupying

. . . this new three-story and basement addition to its general office in Houston. The accounting department is on the first floor which is 70 ft. by 90 ft. The second floor is being used by the engineering department and the basement serves for files, records, blue printing, and other reproduction equipment. The third floor is for future use.

Flow Rate Variation Is No Problem...



Partially completed building in the foreground houses the COLD-FRAC assembly, the chiller and pump gas scrubber assembly, the 66-ton refrigeration unit assembly and the stabilizer. All assemblies are skid-mounted. Space is also provided for the future addition of another chiller and refrigeration unit.

Building in center background houses fired equipment consisting of a glycol regeneration—fuel gas scrubber skid assembly, a salt bath heater ammonia reboiler, and oil bath indirect heater stabilizer reboiler.

Building in extreme left background houses the cooling tower water basin, pumps and water temperature controls for an adjacent cooling tower.

In This BS&B COLD-FRAC Gasoline Plant Built For Provost Viking Gas Unit

Approximately ten miles north of Consort, Alberta, Provost Viking Gas Unit recently put a new natural gas compression and dew point control plant on stream which *automatically* adjusts to variations in the flow rate of the inlet gas. BS&B designed and furnished all process equipment in this plant exclusive of compression.

Compressed gas at 800 psi is processed through BS&B COLD-FRAC low temperature separation equipment utilizing ammonia absorption refrigeration, to produce gas with 15° F. maximum hydrocarbon and water vapor dew points. A BS&B stabilization unit processes the condensed hydrocarbons to provide a 14# RVP gasoline.

The plant is presently equipped to process up to 44 MMSCFD, but future expansion has been provided for by the installation of a compressor suction scrubber and a low temperature separator designed to process up to 88 MMSCFD at 800 psi working pressure.

If your future plans call for the installation of a gasoline plant, why not talk it over with your BS&B Man? He'll gladly analyze the problem with you and will recommend the best combination of equipment to meet your requirements. Or, you may write to . . .

BS&B — OVER 60 YEARS — RELIABILITY — ANOTHER EXAMPLE OF PRODUCT LEADERSHIP

BLACK, SIVALLS & BRYSON, INC.

P. O. Box 1714 — Oilfield Equipment Division, Dept. 1-A11 — Oklahoma City, Okla.

presidents C. H. Altholz, Warner Drey, and A. E. Cates. E. B. Michaels, president of the new company, and Ralph Michaels, vice president and treasurer, will headquarter in Chicago.

Air Reduction Sales Co. names

. . . Fred T. Wilson, Jr., assistant manager, sales, at New Orleans, to manager there, reports H. C. Wallace, regional sales manager. E. C. Kennedy, salesman, New Orleans, succeeds Wilson as assistant manager, sales. Wilson has been with Air Reduction since 1947 and Kennedy has been with the company for 6 years.

Ross-Martin Co. to circulate

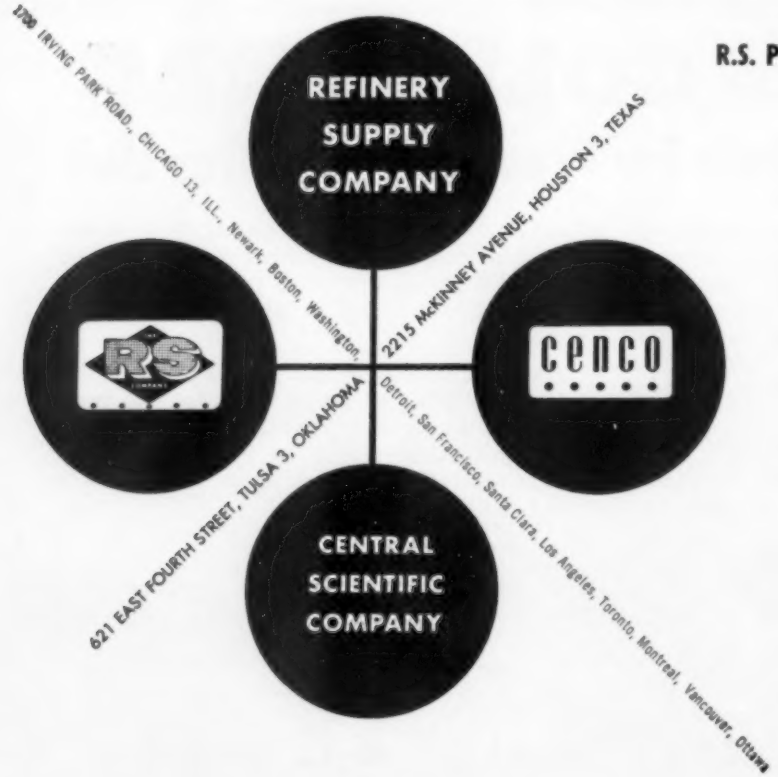
. . . the first issue of Systemation, a copyrighted systems newsletter on April 15, 1959. The newsletter is recognition of the high interest in systems, procedures, and methods shown by modern management today. Systemation will be issued 24 times a year. Editor of the newsletter is Leslie H. Matthies.

Charles Raysor appointed

. . . sales engineer for Downingtown Iron Works division of Pressed Steel Tank Co. He will operate out of the main office in Downington, Pa., and cover southeastern Pennsylvania, southern New Jersey, Delaware, Maryland, North Carolina, and Virginia. Another recent addition to the sales force is D. F. Baumler, who has been appointed district sales manager in Buffalo, N. Y.

Geophysical Service, Inc., places on display

. . . the first reflection seismic exploration demonstrator, a push-button operated model of the complete reflection seismic cycle from shot to corrected record section, Tuesday, October 14, at the New York Stock Exchange. The animated demonstrator, as pointed out by GSI President F. J. Agnich, is an integral part of an exhibit sponsored by GSI's parent company, Texas Instruments, Inc. The continuous sequence of events depicting the seismic cycle begins with a simulated dynamite blast. A series of lights represents shock waves from the blast. These shock waves travel downward through a cutaway section of the earth, are reflected to the surface and picked up by seismometers. The impulses actuate flashing lights on a model seisMAC seismic computer which, in turn, produces the corrected records which make up the seismic record section at the right of the display.


REFINERY SUPPLY COMPANY
2700 IRVING PARK ROAD, CHICAGO 13, ILL., Newark, Boston, Washington
2215 McKINNEY AVENUE, HOUSTON 3, TEXAS
RS
cenco
621 EAST FOURTH STREET, TULSA 3, OKLAHOMA
Detroit, San Francisco, Santa Clara, Los Angeles, Toronto, Montreal, Vancouver, Ottawa
CENTRAL SCIENTIFIC COMPANY

R.S. PORTABLE DEAD WEIGHT GAUGE

the practical and accurate method of checking

- **Line Pressures**
- **Rock pressures at wells**
- **Static pressure on orifice meters**
- **Gas pressures on pipe line leakage tests**

This instrument is based on the principle of generation of pressure by application of a known weight to a hydraulic piston on known area. Conversely, an unknown pressure can be measured by balancing its force on a piston of known area with a known weight—the result is extremely accurate pressure readings.

H. C. Capshaw promoted

H. C. Capshaw

. . . to industrial sales manager, according to W. H. Shelton, vice president and manager of the mobile homes division of Spartan Aircraft Co. Capshaw now heads the industrial sales activities of the mobile homes division directed toward supplying mobile units for a wide range of uses within the United States and also overseas.

Slough-DeFlon firm organized

. . . in California to offer engineering service on cooling towers to industry. Jack M. Slough and James G. DeFlon are the principals in the new company which will headquarter in San Marino, Calif. Agents for the company will be located in strategic areas throughout the country.

J. M. Slough

James G. DeFlon

Both men are widely known in the cooling tower industry. Slough has been associated with Fluor Corp. and with its subsidiary company, Santa Fe Tank & Tower of Texas, where he was vice president and general manager and sales manager.

DeFlon had been with Fluor Products Corp. as manager of engineering and development, and previously, with Santa Fe Tank & Tower as chief engineer. In 1949 he went to Europe to initiate the English cooling tower firm of Head-Wrightson.

Stran-Steel Corp. names seven

C. V. Blackburn

. . . according to Charles Le B. Homer, president. C. V. Blackburn was named executive vice president. He has been vice president, sales. J. G. Skaaren was named general sales manager. G. R. Thomas replaced Skaaren as manager of building sales. Max Luft becomes marketing services manager. He was formerly manager of customer service and was replaced by Lamar Heine. R. R. Scrase has been named executive assistant to the executive vice president. J. H. Murphy is manager of the newly created product planning and coordinating department.

Bucyrus-Erie Co. appoints

. . . Lewis C. Black as manager of domestic sales. He had been manager of sales for large excavators since January 1958, and had previously served as assistant general sales manager of large machines and blast hole drills. He joined the company as a special apprentice in 1935.

Glen Tableman named manager

. . . of W-K-M Valve Co. (Britain) Ltd., according to B. J. Gross, vice president, marketing, for W-K-M, a division of ACF Industries, Inc. Tableman was previously general sales manager of the W-K-M Division in Missouri City, Tex.

Grove Valve & Regulator Co. holds annual sales meeting

. . . in Houston for the domestic and international sales staff. Attending the three-day session are, back row: George Doty, vice president and general sales manager; Bob Briggs; Clyde Cook; Bill George; Bill Hancock; and John Collins. Second row are: M. H. Grove, president; Bud Pelusi; Mike Malloy; Ted Roby; E. H. McMenemy; Walt Edrington; and John Boynton. Front row are: F. Fergusson; Milt Craven; Bill Decker; Chuck Carter; I. C. Hutchison; and Bill Bowden.

Bits Bite Better

Cameron Weight Indicators show weight on bit (in pounds, not points) with the greatest reliability. Being strictly mechanical in design, there is no chance of high pressure fluid leakage or temperature reflections to affect readings. Your bit will bite into any formation with exactly the right pressure for peak drilling efficiency. All bottom hole operations requiring precise weight control are easier when you COUNT ON CAMERON easy-to-read weight indicators — best on any rig.

Cameron
IRON WORKS, Inc.
P. O. Box 1212-Houston, Texas
Export Office: 7912 Empire State Bldg., New York City. In England: Cameron Iron Works Ltd., 76 Grosvenor St., London W. 1 England

Engineered to do rugged oil field jobs with efficiency and economy

Diamond Roller Chains are first choice on modern equipment like this new Cooper Skytop self-propelled rig. They have *proven* their ability to deliver the power under the most rugged of oil field conditions.

Where power is so important, substitutes can be extremely costly. Today, records show that *more* leading equipment builders specify Diamond Oil Country Chain as first choice. *More* oil field stores sell *more* Diamond Chain than any other. The reasons that Diamond leads are *quality* you can count on, greater *dependability*, and more drilling *economy*.

Look for the Diamond trade-mark on every sideplate.

DIAMOND CHAIN COMPANY, Inc.

A Subsidiary of American Steel Foundries

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Tulsa Office: 2238 Terwilleger Blvd.

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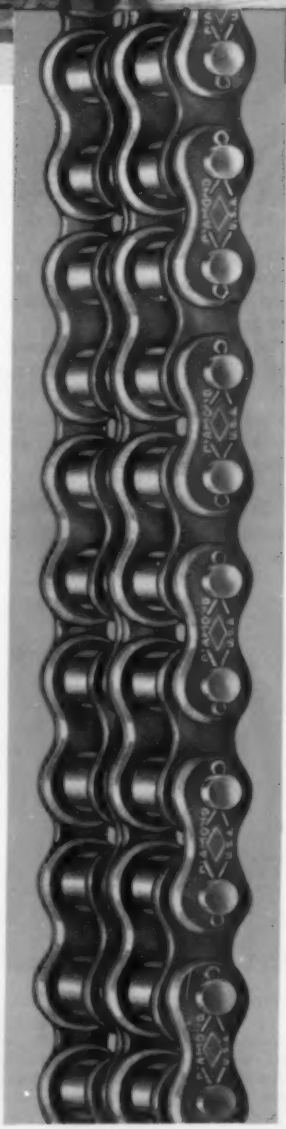
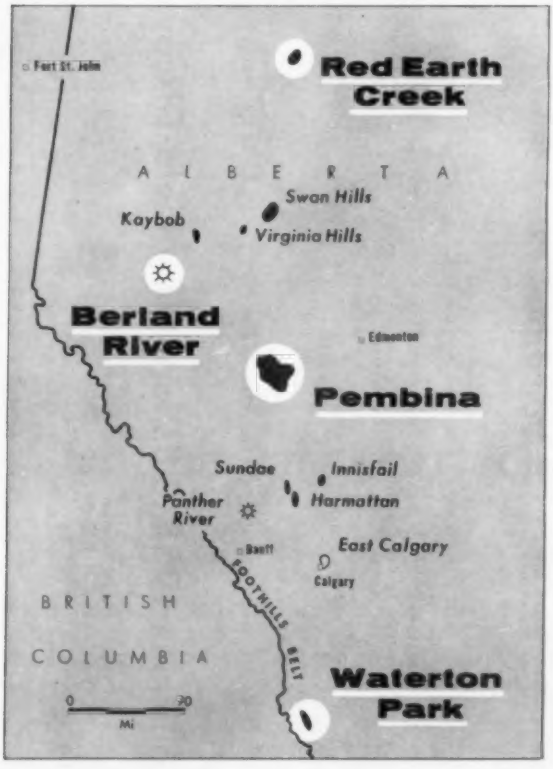
Please refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER



DIAMOND ROLLER CHAINS

Independents watch closely as . . .



Canadians enter winter freeze

BY NORMAN S. MORRISEY

WESTERN CANADA'S success record is startling. In the past 10 years, operators have drilled 6,673 wildcats, bringing in 1,777 discoveries. Success ratio in wildcat drilling is 27%. The first 9 months of 1958, though poor by Canadian standards, have witnessed 124 discoveries in a total of 528 exploratory tests.

Until recently, Canadian oil-finding enjoyed a rather unusual history. Except for the Foothills belt, production has been almost entirely from strat traps. But now, the accent on exploration is changing. Canadian geologists are combining structural and stratigraphic work to uncover vast new fields.

The Foothills belt is a prime example of what Canada holds in store for the wildcatter. Pioneer in the Foothills belt was Turner Valley with its major oil reserves. Then came Pincher Creek with its half billion dollars in gas and liquids. The latest pearl in the chain of major fields in the belt is Waterton Park. This new bonanza has catapulted into the No. 1 position among Canadian gas fields with reserves on the order of 3 trillion cubic feet based on 28 billion cubic feet of recoverable gas per section!

Old standby . . . Canadian geologists, however, are not going overboard on structure and ignoring strat plays. Reef production at Leduc spawned Alberta's oil boom, Today, reefs are still a major target for many companies. Berland River, Kaybob, Virginia Hills, and Swan Hills are all strikes within the last 2 years . . . each has the earmarks of a major field. Berland River could become the biggest reef field in Canada. The discovery well logged 663 ft. of Devonian D-3 reef, testing 1.5 billion cubic feet of gas daily, making it the world's biggest single gas well based on its calculated open-flow potential. On top of having the thickest reef pay section in Canada, Berland River is also the deepest producer with gas coming from below 12,000 ft.

Major oil reserves at Pembina have turned the spotlight on the oil possibilities of Cretaceous sands in recent years; too often those zones were ignored by Canadian geologists in their quest for Devonian reef production.

Far to the north at Red Earth Creek, Union Oil Co. of California is exploiting major oil reserves from the granite wash. And, within the past month Union tapped the Swan Hills pay in this field, moving the Middle Devonian potential far to the north of Swan Hills.

Past success records and the excellent possibilities of finding major oil fields are enticing more and more U. S. independents north of the border. The reasons are obvious:

- Canada is a young oil province.
- The Foothills belt is shaping up into a colossal gas-producing trend.
- Numerous major oil fields have already been tapped on the stable side of the basin.
- And, in the quest for huge fields, companies may be overlooking small but lucrative oil and gas fields that are the bread and butter for the average independent.

The winter ahead will be long and frigid, but, among Canadian oil finders, the anticipated new discoveries will dispel Calgary's cold better than a hot toddy.

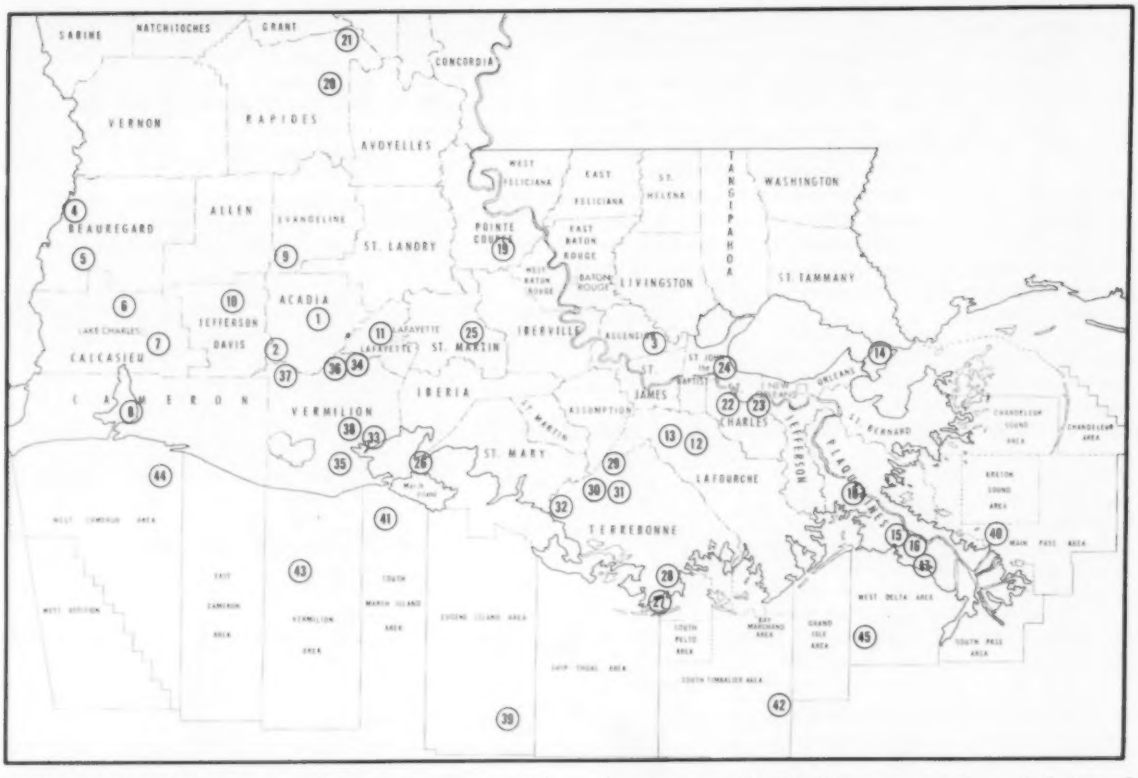
South Louisiana 1958 Onshore New Field Discoveries

Map Index No.	Parish	Field	Discovery operator and well	Discovery month	Total depth (ft.)	Prod. depth (ft.)	Type prod.	Additional wells comp.
1	Acadia	East Ellis	Midwest Oil Corp. 1 Lawson	Feb.	12,794	11,596-11,609	G-C	1 (oil)
2	Acadia	Southwest Mermentau	Amer. La. Pipeline Co. 1-A Desormeaux	Feb.	10,250	9,589-9,602	G-C	1
3	Ascension	North Sorrento	Austral Oil Exploration Co. 1 Fridge	Sept.	11,318	9,973-77	G-C	
4	Beauregard	Alligator Lake	Russell Maguire 1 Crawford	Feb.	12,056	10,684-92	Oil	*4
5	Beauregard	South Bearhead Creek	Penton & Penton 1 Lutcher-Moore	May	8,709	8,508-18	G-C	
6	Calcasieu	East Buhler	W. W. F. Oil Corp. 1 Anderson	June	9,501	8,790-93	G-C	1 (dry)
7	Calcasieu	South Manchester	Charles H. Lawrence, Jr. 1 Farmers	Jan.	5,106	4,586-91	Gas	1 (dry)
8	Cameron	Calcasieu Lake	H. L. Hunt 2 State Lease 2402	July	14,054	11,834-38	Oil	1
9	Evangeline	East Basile	Sun Oil Co. 1 Haas-Hirsch	Aug.	8,861	9,988-96	Oil	1
10	Jefferson Davis	Southwest China	Cyprus Oil Co. 1 LaBauve	July	10,727	10,565-93	G-C	
11	Lafayette	Unnamed	The Texas Co. -Seaboard, Inc. 1 Edwin Roy	Aug.	13,299	10,699-03	G-C	
12	Lafourche	Rioux	Union Oil Co. of California 1 L.L.&E.	Feb.	13,500	11,794-11,808	G-C	1 (dry)
13	Lafourche	West Lake Boeuf	R. Mosbacher-Continental 1 Libby-Blouin	July	13,048	12,943-49	G-C	
14	Orleans	Lake St. Catherine	K. A. Meredith-Reece Carter 1 State Lease 3327	Apr.	5,575	5,435-41	Gas	1 (dry)
15	Plaquemines	Adams Bay	Phillips Petroleum Co. 1 State Lease 3091	Feb.	13,008	11,509-12	Oil	3 (1 dry)
16	Plaquemines	Bay Pomme d'Orr	Gulf Oil Corp. 1 State "PP"	Jan.	15,000	7,884-94	Gas	
17	Plaquemines	Cyprien Bay	Tidewater Oil Co. 1 State Lease 3155	Jan.	14,600	13,035-40	G-C	2
18	Plaquemines	Diamond	John Mecom-E. Cockrell 2 Vaccaro	Aug.	12,622	10,804-14	G-C	
						11,739-45	Oil	
19	Pointe Coupee	Livonia	Texas Crude Oil Co. 1 Bergeson	Jan.	11,319	10,728-35	Oil	
20	Rapides	Kolin	Roger J. Bassett 1 Lee Lumber Co.	Feb.	7,612	6,442-44	Oil	1 (dry)
21	Rapides	Unnamed	A. J. Hodges et al 1 Nesbitt	Sept.	5,565	4,095-97	Oil	
22	St. Charles	Destrahan	Russell Maguire 1 Elfer	May	10,525	9,049-53	G-C	
23	St. Charles	West Avondale	Anderson-Prichard and Union Oil & Gas Co. 1 Brady	Jan.	13,593	10,025-27	G-C	2 (1 dry)
24	St. John the Baptist	Bonnet Carre	F. A. Callery, Inc. 1 Montegut	Feb.	11,438	9,012-18	Gas	5
						9,431-35	Oil	
25	St. Martin	East Section 28	Kerr-McGee Oil Industries, Inc. 1 LaRose	June	13,045	12,555-75	G-C	
26	St. Mary	East Lake Sand	C. G. Glasscock et al. 1 State Lease 2682	June	14,203	13,714-18	G-C	
27	Terrebonne	Bay Round	Mississippi River Fuel Co.-Hope Natural 3 State Lease 3141	May	13,450	12,165-92	G-C	3 (2 dry)
28	Terrebonne	Charley's Bay	California Co. 1 L.L.&E. 2	Aug.	12,654	10,630-36	G-C	
29	Terrebonne	Donner	Humble Oil & Refining Co. 1-B Lutcher-Moore	Aug.	15,128	12,504-10	Oil	
30	Terrebonne	North Turtle Bayou	Shell Oil Co. 1-E Continental Ld. & Fur Co.			12,664-74	Oil	
31	Terrebonne	Northeast Turtle Bayou	Shoreline Drilling Co.-American Nat. Gas Co. 1 Continental Ld. & Fur Co.	Jan.	14,276	14,158-68	G-C	3
				Aug.	12,305	12,230-43	G-C	1 (dry)
32	Terrebonne	West Deer Island	Southern Natural Gas Co. 1 Continental Ld. & Fur Co.	Mar.	12,309	11,760-64	Oil	1 (dry)
33	Vermilion	Buck Point	Sunray Mid-Continental Oil Co. 1 State Lease 3020	Feb.	17,000	13,891-95	G-C	
34	Vermilion	North Andrew	Sinclair Oil & Gas Co. 1 Pickard	Mar.	13,000	12,158-66	G-C	1
35	Vermilion	North Fresh Water Bayou	Union Oil Co. of California 1-F Louisiana Furs	Apr.	14,570	13,310-25	G-C	3 (1 oil) (1 dry)
36	Vermilion	Perry Point	C. B. Wrightsman 1 Petry Estate	Apr.	12,101	10,061-68	Oil	3 (1 dry)
37	Vermilion	Riceville (Bonin)	Sid Richardson Carbon Co. 1 Bonin	Apr.	15,225	15,025-66	G-C	1
38	Vermilion	Southwest Esther	Mosbacher-Hurt-Union Oil Co. 1 Louisiana Furs	Mar.	13,020	12,416-34	G-C	1 (dry)
						12,900-10	G-C	

*Two wells (gas-condensate) in Newton County, Texas.

South Louisiana 1958 Offshore New Field Discoveries

39	Eugene Island	Block 208	Continental Oil Co. (CATC Group) 1 OCS-0576	Sept.	9,612	8,879-85	Oil	
40	Main Pass	Block 45	Cities Service Production Co. 1 State Lease 2715	Aug.	10,000	8,772-76	Oil	1 (dry)
41	Marsh Island	Unnamed	The Texas Co. 1 State Lease 340-S (OCS-0310)	Aug.	12,866	8,506-16	Gas	
42	South Timbalier	Block 131	Gulf Oil Corp. 2-A OCS-0457	Mar.	7,667	6,706-14	Oil	2
43	Vermilion	Block 86	Zapata Offshore Co.-Felmont Oil Co. 1 OCS-0172	Feb.	10,910	10,828-14	G-C	
44	West Cameron	Block 67	Union Oil Co. of California 1 OCS-0259	May	13,078	11,345-55	Oil	
45	West Delta	Block 70	Continental Oil Co. (CATC Group) 1 OCS-0182	Feb.	13,495	9,240-54	Oil	



SOUTH LOUISIANA'S 1958 new-field discoveries spotted on this map are identified in accompanying tabulation of discovery wells.

Drilling off, but discoveries jump in coastal Louisiana

BY NEIL WILLIAMS
Associate Editor

THIS YEAR'S SLOWUP in drilling is not keeping down the discovery of new fields in Louisiana's coastal region.

Although drilling there is off more than 250 completed wells, nearly 160 of them exploratory, as compared with 1957, the discovery of new fields is approaching a record number.

More than 45 entirely new fields have been found on the Louisiana coast this year with 2 months left to go. This lacks only 7 of equalling last year's 12-month total. It is only 21 short of the 1956 record of 66 new-field discoveries when exploratory drilling in that region was at its peak.

It is significant that all except seven of this year's new-field discoveries have been on the "onshore" side of the coast. Active, wide-spread, and intensive exploration over the years in coastal Louisiana's onshore area evidently has not exhausted all its potentialities for additional exploitation. This area, despite its vast array of fields accumulated and prolific production already developed, remains a prime hunting place for additional oil and gas reserves.

The seven new offshore fields found this year lack five of coming up to the number discovered during 1957. They are 15 short of the number opened during 1956, and 17 under 1955's record number of 24 discoveries. The greater number of new offshore fields found in 1957, 1956, and 1955 more than spell the difference in the total number of fields found this year as compared with the totals for the previous years.

With 2 more months left, there still is the likelihood of additional new fields being found this year that will boost the total to, or possibly above at least that of 1957's discoveries. Already, since the accompanying tabulation of 45 fields was completed, one additional new field has been opened, and indications given of another.

The fewer new offshore fields found this year may reflect the drastic curtailment of drilling in offshore areas. The drilling drop, most of it exploratory, in these areas has been much greater proportionately than on the onshore side of the coast, although there has been a substantial decline there. Offshore drilling now is down to fewer than 40 active rigs as compared with upwards of 120 rigs during late 1956 and early 1957.

The sharp drop in offshore drilling is not interpreted as meaning any depreciation of earlier optimistic conceptions of the potentialities of the offshore area. This area still generally is regarded as a great frontier for exploration. Drilling to date is looked upon only as having scratched its potentialities, leaving many more fields yet to be found if their density is to come anywhere near matching that on the landward side of the coast.

This year's new-field discoveries are spread across the entire breadth of the coastal region from the Texas line to the far eastern tip. They are in 19 of the 38 parishes embraced in the region, and in 7 of its offshore-designated areas.

Vermilion Parish, in the western sector of the coast, and Terrebonne

Parish, in the east, lead in number of new-field discoveries, tieing with six each. Next in line is Plaquemines Parish, on the far east, with four new fields. All these parishes have been focal points of new exploration. Terrebonne Parish has been specially active, and now leads the coastal region with nearly 50 active drilling operations. Nearly a dozen of these are out and out wildcats with many of the others being exploratory, as extension and new-pay tests around existing fields.

So far there has not been sufficient additional development in any of this year's new fields to determine their respective importance. It also is possible that some of these discoveries, now designated as new fields, eventually may prove to have been major extension of older fields. Only in a few of these fields has there been more than one or two additional wells completed since their discovery. Most development in any of these fields has been at Bonnet Carre, in St. John the Baptist Parish, where five additional wells have been completed.

Next in line is Alligator Lake field, in Beauregard Parish, where four wells, including the discovery well, have been completed. This field is on the state line (Sabine River), where two of the four wells are on the Texas side, in Newton County.

Among the discovery wells four were completed in two zones. In one of these both zones were oil productive. Another was productive of gas and condensate from both zones. The other two were combination wells, producing oil from one zone and gas and condensate from the other.

Currently, 13 of the new fields are exclusively oil productive so far, 25 produce only gas-condensate or dry gas, while 7 are producing both oil and gas-condensate, or dry gas, the latter being either in dually completed wells or in single-zone wells to separate sands. Altogether, 10 of the fields already have proved productive in more than one zone, either in dual-zone completions or in single-zone completions in new-pay discoveries in confirming wells.

New-field discoveries include the finding of first production on what was the Louisiana coast's last remaining unproductive known shallow-piercement-type salt dome. This was at Calcasieu Lake, in Cameron Parish, a dome proved since 1927 and on and around which more than 40 dry holes had been drilled before the discovery well, completed last July.

Deepest production opened in any of the new fields is at Riceville, in Vermilion Parish, where the discovery well was completed with gas-condensate production from a 15,000-ft. sand. Five other fields are productive from sand below 13,000 ft. Shallowest is at South Manchester, in Calcasieu Parish, where the discovery well produced at 4,600 ft.

Through the middle of October 234 wildcat wells had been completed on the Louisiana Coast. These included 211 on the onshore and 23 offshore. In addition to the 38 onshore and 7 offshore new fields opened, this exploratory drilling has resulted in major extension and new-pay discoveries at more than 60 older fields.

Since the accompanying tabulation of 45 new fields was compiled, Union Oil Co. of California has opened another productive area, located 3½ miles southwest of Lake Decade field in southwestern Terrebonne Parish. It makes seven new fields opened in that parish this year. Union's discovery well, 1-S Louisiana Land & Exploration Co., is productive of dry gas (5,300 M.c.f.d., 5/32-in. choke) from sand at 12,122-35 ft. with total depth of 14,500 ft.

OFFSHORE DRILLING in Lake Erie is centered at three points on the Canadian Ontario side — Long Point, Tilbury, and Pelee Island.

Drillers race icy weather at three Ontario sites

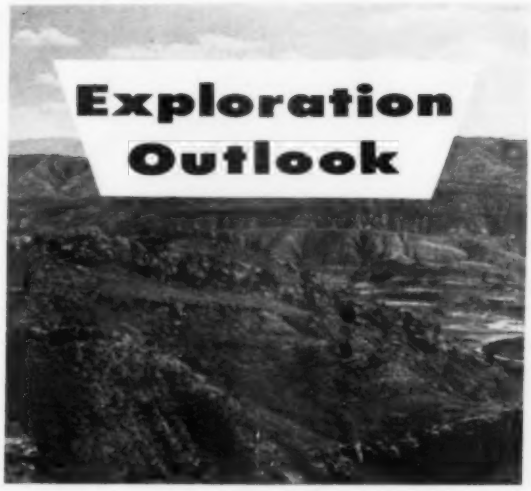
OFFSHORE DRILLING in Lake Erie is at a fast clip, rushing to meet the iceup deadline which is due in several weeks. Bluewater Oil & Gas, Ltd., is currently active at three locations in the lake. The wells are in the Pelee Island area, Long Point, and off Romney.

Bluewater-Phillips 1 Pelee Island is drilling at 853 ft. Top of the Guelph is expected near 950 ft. There is some oil from this formation in the center of the island itself. Projected depth of the Pelee well is to the 2,500-ft. mark in the Trenton-Ordovician. The well is 75 ft. offshore on the west side of the northern end of the island.

Bluewater and Phillips Petroleum Co. have drilling rights on six Lake Erie licenses of occupation, amounting to 29,451 acres, adjoining Pelee Island. Bluewater has a 50% interest in about 3,500 acres of leases on the island itself. The 1 Pelee Island is being drilled under a joint program with Phillips which is earning a 35% interest in the acreage.

The second well in the area is Bluewater 2 Port Rowan. This is going to the Silurian. Three prospective pays lie in this region—the Clinton, the Red Medina, and the White Medina. This well is being put down on a block of licenses of 9,740 acres owned totally by Bluewater. There were wells drilled on Long Point, closest production, 40 years ago with good Silurian gas shows. The current well is about 1 mile north of the Long Point Peninsula in shallow water of Long Point Bay.

The third well in Lake Erie is Bluewater 1 Harvest Wheatly, 3½ miles offshore from Romney Township and about 10 miles west of the water end of Tilbury gas field. Drilling of all three wells is expected to be finished up in time for the ice shutdown.



. . . appraising the future by surveying the past

WYOMING is in the midst of its most significant and rewarding wildcat surges in recent years. In October Atlantic Refining Co. and Fremont Petroleum Co. gave the state and the Rocky Mountain province their candidate for the year's most important oil find—O'Brien Springs.

Discovery of Tensleep-Pennsylvanian oil at Carbon County's O'Brien Springs is another bright step in the deep-drilling trend of thought now invading the basins of Wyoming . . . and, indeed, the basins of the entire continent. This "no man's land" wildcat was completed flowing 196 bbl. of oil in 4 hours on ¼-in. choke from perforations at 6,891-7,002 ft., forcing a reappraisal of one of the Rockies' most prolific and famous pay zones. The well is also a Nugget-Jurassic gas producer, bringing to three the number of pays in this new field. Frontier gas production was tapped at the discovery well earlier.

O'Brien Springs appears to be the best outgrowth yet of the flourishing new era of deep-drilling thinking in the Rockies, particularly Wyoming. Its success should portend what lies in store for the region's oil hunters when they move into the deeper hunting grounds along the flanks of the many basins in the state. This deep push paid in the central reaches of the Powder River basin (Dakota oil was found at Coyote Creek in October), it hit home at Grass Creek, is cracking the vastness of the Green River basin, and now O'Brien Springs is a possible major oil find in a "Tensleep-barren" section of south-central Wyoming where very little drilling has gone to the Pennsylvanian.

Wildcats to watch this fall include Trigood Oil Co.'s Minnelusa-Pennsylvanian test in Sheridan County's Arvada area in the dry northwestern portion of the Powder River basin, and a Belfer Natural Gas Co. try in wide-open wildcat country between LaBarge and Church Buttes fields in the Green River basin. Trigood will go to 10,125 ft. at the 2 Ingram; Belfer will forge down to 11,000 ft. for a look into Frontier-Cretaceous possibilities at Lincoln County's Opal Unit test.

Texas' stubborn Delaware basin has the world's deepest hole at Phillips Petroleum Co. 1-EE University, Pecos County. This 25,000-ft.-plus hole is just a small part, however, of the growing probe of ultradeep wildcats in one of Texas' last oil frontiers. A flurry of wildcatting with the accent on deep puts this basin on the busy list with tests going down all the way from its northern rim in New Mexico, through the Sheffield channel, and into the western Val Verde basin.

Louisiana's midriff parishes are in for another look as a result of two widely separated wildcat strikes. The new fields are more than 70 miles apart, one in Sabine, the other in Rapides Parish. Shell has a Saratoga discovery in Sabine on the west, while Hodges found Wilcox oil in Central Louisiana's Rapides Parish. This middle section of the state has long been too wildcat-quiet. Production is sparse, but the outlook anything but cloudy.

North Tejon and Pacific tidelands figured highly in the month's wildcat happenings. Reserve Oil & Gas Co. got 1,190 bbl. of oil daily at the 348-18 Butler-Wehr, closing the 1-mile gap between the Highway and Main areas of prolific North Tejon field in the San Joaquin Valley. This field takes on more promise with each big addition. The new strike assures a field of at least 2 miles in length, east-west, and apparently connects the Highway and Main areas into one field.

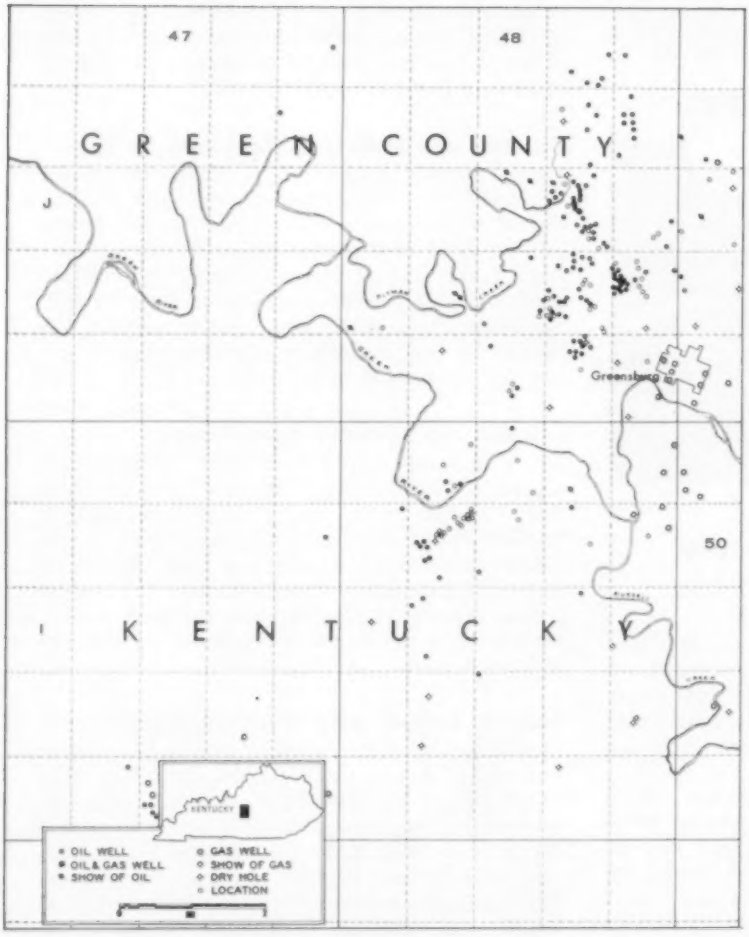
. . . **Offshore.** Three offshore tests are busy hunting oil off the Pacific Coast in the state's tidelands . . . one at Richfield's Rincon island off Ventura County, Standard Oil Co. of California's Gaviota test off Santa Barbara, and Standard's first wildcat on the Summerland lease.

Wildcat scope during month ranged from Matador arch to Alaska, with important discoveries reported in King County, West Texas; Chaves County, New Mexico; extension strikes at Citronelle field in Alabama; and new locations on the Kenai Peninsula.

• West Texas' Matador arch, a long-slumbering possible future oil province, picked up new interest as a result of Pan American et al.'s gas-condensate hit on the eastern end of the uplift in King County. There has been little success on this dividing feature between prolific Permian basin fields and those of the Texas Panhandle. A long east-west string of nonproductive counties await the drill.

• An Ellenburger gas-condensate strike in Chaves County is believed to be New Mexico's first such production off the Central basin platform.

John C. McCaslin



THE NATION'S BUSIEST NEW SHALLOW OIL AREA: Greensburg, Central Kentucky. This map was drawn from the "Preliminary Oil and Gas Map of Green County", compiled by Daniel J. Jones and Robert E. Hauser, University of Kentucky, Kentucky Geological Survey, Lexington.

Bluegrass oil boom flourishes

THE NATION'S most active shallow area is developing at a phenomenal clip. Since the first of the year nearly 400 oil wells have been completed in central Kentucky's Green County.

This 300 to 500-ft. producing area appears to be comprised of two oil fields: Greensburg pool, located north of the Green River and west-northwest of the town of Greensburg in Carter Coordinates J-48 and J-49; and, Thurlow pool, generally south of the Green River and southwest of Greensburg town in I-48. However, these two pools could well connect soon as there is just a short interval between them.

Pay zone . . . The pay in the area is mostly an upper Silurian dolomite, locally called "Blue band." It occurs about 40 to 50 ft. below the base of the Devonian (Chattanooga or Ohio) Black shales. Apparently it is an open vugular dolomite. Occasionally, there is production just below the shale. This is called the Corniferous (Silurian) pay. A third pay also occurs especially in the Thurlow pool called "Yellow Cap" which is basal Silurian dolomite, resting above Ordovician strata.

Production . . . Daily output in the field is now reported as 8,000 bbl. from some 300 to 400 wells. Large volumes of salt water are produced with the oil, causing much concern to the state water-pollution committee. There are no pollution laws in the area. Consequently, local residents and area farmers and industries are feeling the effects of water being dumped into regional streams.

Depths . . . Wells are shallow, ranging from about 400 to 600 ft. in depth. Cable tools are used exclusively. Well spacing is close; in some instances right next to each other. All producers are on pump.

Geology . . . Regionally, the area lies west and downdip from the crest of the Cincinnati arch, a large regional structure.

Kentucky depth record broken

FIRST TEST in Kentucky to crash the 10,000-ft. depth barrier is a wildcat of United Fuel Gas Co., 1 S. B. Williams, currently drilling at 10,280 ft.

Located on Quicksand Creek, 4 miles east of Jackson, the county seat of Breathitt County, the well is now nearly 1,000 ft. below the former depth record of 9,432 ft. set several months ago by United Fuel.

Formation being drilled is not known, but operator is presumably in the Cambrian and looking for basement rock.

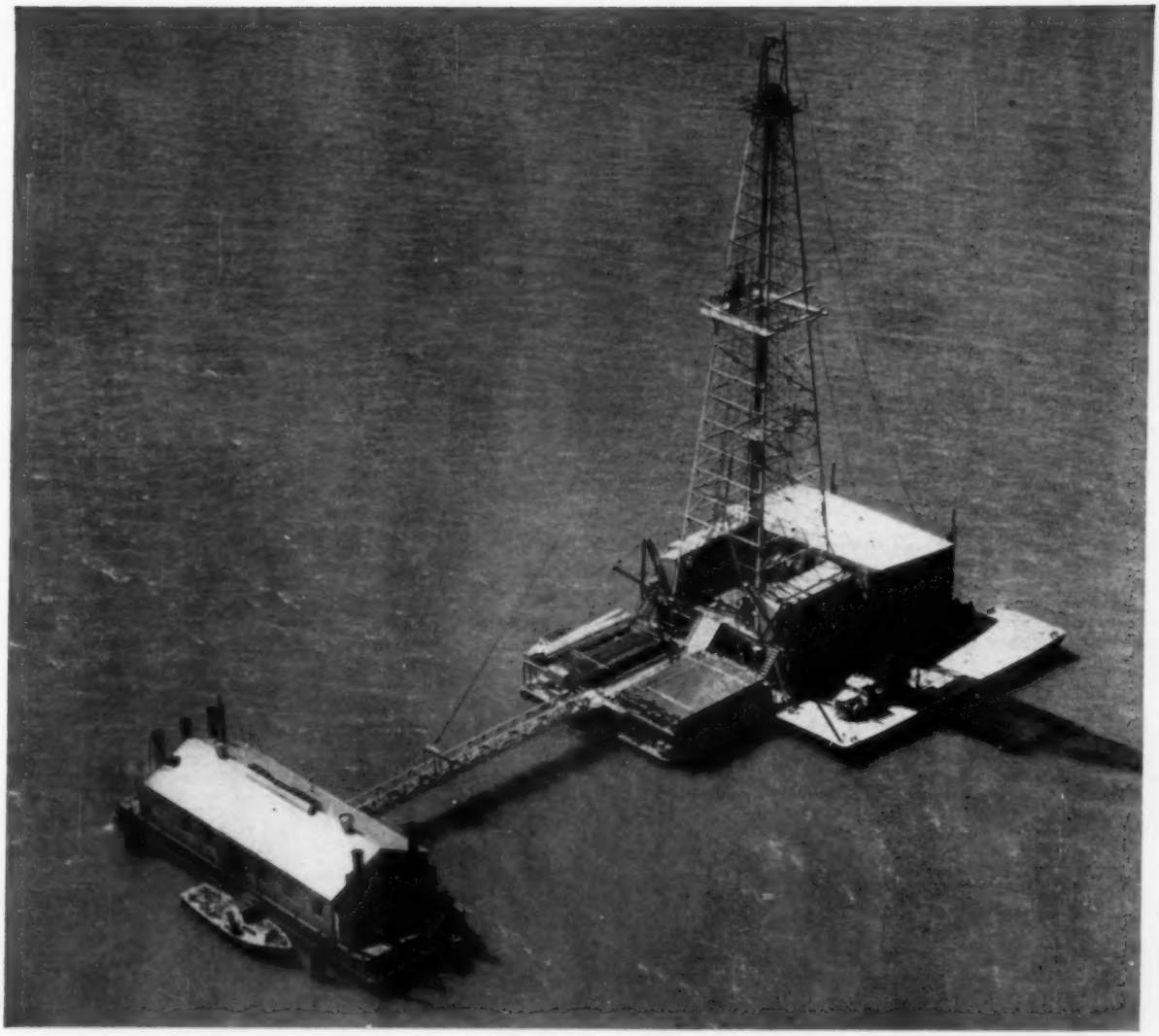
Salina oil play looms in Michigan

A NEW AREA in St. Clair County, 5 miles southwest of the Peters-Casco play, shows promise for the development of oil in the Salina-Niagaran section.

Fisher-McCall Oil & Gas Co. 1 Taetz, SE SE SW 31-4n-15e, Casco Township, logged A-1 Salina at 2,465 ft. and gas at 2,467 ft., oil at 2,559-65 ft., present total depth. Before 5-in. casing had been run, well filled and flowed in 6 hours and had produced 210 bbl. oil in 4 days, part of the time shut in. Production is from the Salina as contrasted to the deeper Niagaran reef, chief producing zone in the Peters area to the northeast.

Interestingly enough, Panhandle Eastern had drilled a discovery gas well 5 years ago in both the older and new play areas. The new strike touched off another wave of lease dealing and development plans. Meanwhile, three more wells in the Peters area cored reef oil pays to extend the proved area over 1 mile north-south.

William Messel 1 Potter NE SE NE 11-11n-4w, diagonal northeast offset to the discovery in the 5-year-old Sumner pool, Gratiot County, flowed 200 bbl. oil in 8 hours natural from Traverse lime pay at 2,822-25 ft., and was pinched to 5 bbl. per hour. Far better in initial production than the previous 15 wells drilled, the well may open an important northeast extension.



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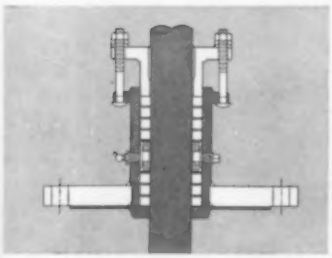
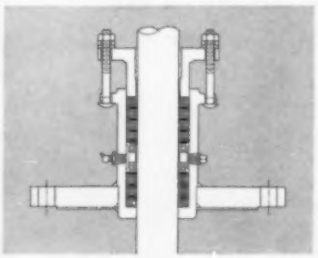
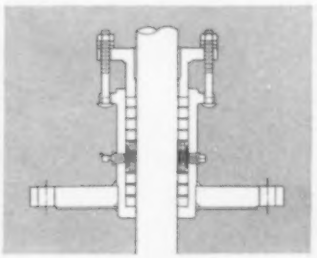


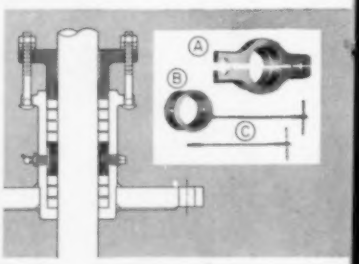
1. SAVE COST of a special-alloy mounting flange with all-welded LIGHTNIN construction. Forged steel flange is faced with correct alloy for your process conditions. Hub is solid alloy. Alloy parts are shown in gray.



2. GET SUPERIOR SEALING with 7 rings of large-cross-section packing. Separators facilitate packing removal, distribute force uniformly. Gland bolts, threaded part way, prevent overtightening.



3. GET BETTER LUBRICATION without repacking. Lantern ring evenly distributes lubricant; permits continuous lubrication under pressure; extends time between repackings. Relief plug prevents overlubrication.



4. REPACK FASTER with exclusive split packing gland (A) that comes right off the shaft to allow maximum work space. Lantern ring (B) lifts out quickly by means of pullers (C), standard accessories.

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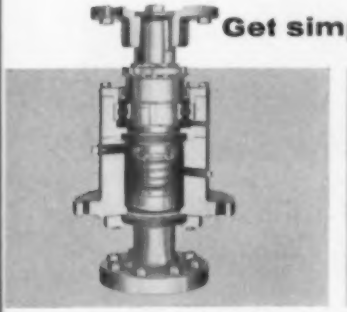

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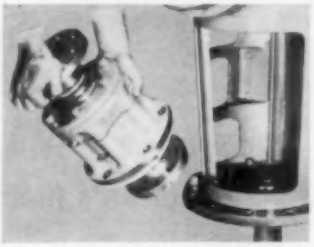
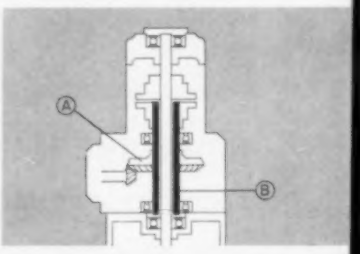


3. REPLACE SEAL ASSEMBLY quickly, if ever necessary—without dismantling mixer or removing it from tank, and *without skilled manpower.* Seal cartridge unbolts, comes out as a unit; replacement bolts in.



4. RETAIN GEAR ALIGNMENT when changing seal. Mixer gears (A) are isolated from shaft by hollow drive quill† (B) —*cannot get out of line* when seal is removed. Shaft realignment is automatic on reassembly.

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Town-lot spurt in Bakersfield

THIRD TEST of a large block of town-lot leases in Bakersfield proper by Union Oil Co. of California was getting ready to spud. This latest test will be drilled about 2 miles northwest of two earlier dry holes.

In an interesting town-lot lease play, Union Oil Co. signed up more than 2,500 landowners involving some 700 acres.

The two earlier tests failed to turn up commercial production even though the town itself is virtually surrounded by oil fields. The search is for Stevens sand production.

Vernalis gas-field strike extended

AN EXCELLENT extension test has been completed by Porter Sesnon, et al., as operator for itself and Great Basins Petroleum Co., to its earlier gas-field discovery in the Vernalis region of San Joaquin County is reported.

The latest success, 33-22 Sesnon-Giambastiani, was completed making more than 10 M.M.c.f.d. of gas. It is located about ⅔ of a mile west of the field discovery well which is currently delivering 500 M.c.f.d. through a 3/64-in. choke to Pacific Gas & Electric Co.

Great Basins holds a one-half interest in both wells completed thus far and has under lease 30,000 acres near the discovery.

Standard Oil Co. of California was preparing to complete a well offsetting the Vernalis discovery to the southeast. Producing interval of the discovery is 3,860-75 ft. and 3,880-85 ft.

New test at San Emidio

A WILDCAT has been spudded on the San Emidio Nose trend in Kern County by Bandini Petroleum Co. and Hamilton Dome Oil Co.

The Bandini-Hamilton test is located about 1 mile north of Richfield Oil Corp.'s San Emidio Nose field discovery. The Bandini-Hamilton people announced they have a programed depth of 12,000 ft. for the ridge-reef test.

Bandini-Hamilton have one of the strongest land pictures in the San Emidio Nose play with approximately 1,100 acres, 45% of which is within 1½ to 2½ miles of the discovery area.

A tally at San Emidio now shows two completions, one drilling and a site staked for a fourth test. All are Richfield wells, except for the Bandini-Hamilton test 1 mile north of the discovery. The next Richfield effort will be just two locations east of the extension they presently have drilling below 11,877 ft.

New Oregon test slated

Linn County Oil Development, Lebanon, Ore., announced plans to drill a 5,000-ft. wildcat approximately 14 miles southeast of Albany in Linn County. Spud date was not revealed.

Inside Hugoton hit

SOUTH EUBANK is a new pool in Haskell County, southwestern Kansas. W. J. Coppinger opened the pool at the 1 Collingwood in C NW NE 8-29s-34w. It produces from Chester-Mississippian.

The field opener pumped 140 bbl. of oil per day from perforations at 5,433-45 ft.

Nelson Refinery Construction Index

Appears in the first issue each month.
Compiled by W. L. Nelson, petroleum refinery consultant, Tulsa.
The Index was explained October 1, 1956 (page 110), as well as the Indexes of Individual Items of Equipment that appear on the Costimating page in the first issue of the months of January, April, July, and October.

Index (1946 = 100)

	1950	1954	1955	1956	1957	July 1958
Pumps, compressors, etc.	138.2	166.5	172.2	192.0	206.7	213.6
Electrical machinery	134.9	160.0	162.5	175.0	188.9	193.3
Internal-combustion engines	126.0	150.5	153.2	164.0	173.9	178.4
Instruments	127.8	154.6	162.9	182.1	187.4	†193.5
Heat exchangers	140.0	171.7	156.8	190.7	203.6	174.2
Misc. equipment average	*126.2	160.7	161.5	180.5	192.1	†190.6
Materials component	149.5	174.6	176.1	190.4	201.9	†202.2
Labor component	144.0	183.3	189.6	198.2	208.6	222.6
Nelson construction index	146.2	179.8	184.2	195.3	205.9	†214.4

*Used in computing the Nelson Index until April 1952. This is slightly different from the average of the Miscellaneous Equipment Items shown above.
†Preliminary.

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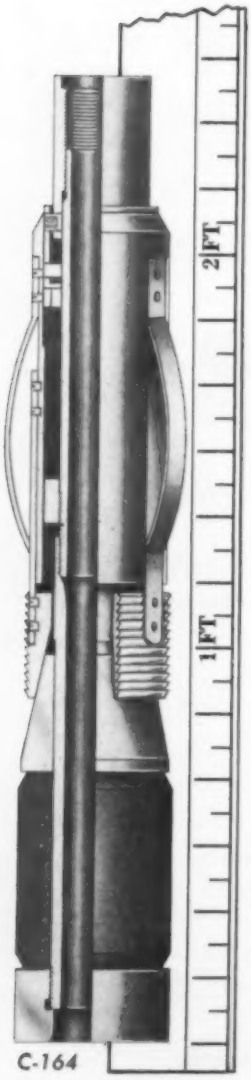

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Deep Hugoton pool adds producer

COMPLETION INFORMATION has been released by White Eagle Oil Co. on two new oil wells in Pleasant Prairie field, Finney and Haskell counties, southwestern Kansas.

The two new completions bring the company's total number of oil wells on its 25,000-acre block in Hugoton gas field to 21, with two more wells being completed, and two wells drilling. White Eagle has two drilling rigs busy working on a steady development program of this pre-Permian field.

The two recently completed wells are: the 30-4 Devlin-Jones, C SW¼ NW¼ 30-26s-34w, Finney County; and "O" 27 Jones, C NE¼ NW¼ 8-27s-34w, Haskell County. The Devlin-Jones well drilled to total depth of 5,202 ft., finding the top of the St. Genevieve at 5,049 ft. and the St. Louis at 5,092 ft. After the well was acidized with 1,000 gal., it swabbed 43 bbl. of oil per hour from perforations at 5,139-52 ft. and 55 bbl. per hour from perforations at 5,098-5,114 ft. A pumping unit is being set on the well and flow lines are being hooked up.

The "O" 27 Jones well drilled to total depth of 5,168 ft., topping the St. Louis at 5,042 ft. After acid treatment, the well swabbed 18 bbl. hourly from perforations at 5,011-14 ft.; and 21 bbl. hourly from perforations at 5,044-62 ft. Good oil shows were cored in the Topeka lime and sampled in the Morrow sand.

Third field for South Dakota?

SOUTH DAKOTA may have its third oil field at a wildcat in the northwestern corner of the state. The possible field opener is Schlaikjer-Clarkson 1 Government, E½ SE NW 23-21n-3e, Harding County, 3½ miles southwest of Buffalo field.

Recovery on a drill-stem test of the Red River-Ordovician at 8,460-8,511 ft. was 890 ft. of heavily gas-cut oil. Drilling is continuing toward contract depth.

This well would open the state's third oil field, the other two being nearby Buffalo and a small area in Custer County far to the south near the Black Hills. There has been no drilling between the new find and Buffalo field (a three-well pool). Location is on the trend of Cedar Creek anticline fields, the closest of which is Little Missouri in Bowman County, North Dakota.

Third well set for new Wyoming pool

LOCATION for the third test in new Coyote Creek field, Crook County, Wyoming, is planned. Mobil Producing Co. and Midwest Oil Co. will drill the F-43-33-G in the C NE SE 33-49n-68w.

This well will go to the Lakota-Cretaceous at near 6,510 ft. It will be the third try for production in the recently opened Dakota pool. The discovery well, 1 Krause, drilled by True Oil Co. in N½ NW SE 33-49n-68w, flowed 450 bbl. of oil per day from perforations at 6,474-78 ft. The 2 Krause in C SE NW 33-49n-68w, has production string set.

Coyote Creek field, newest discovery of Dakota oil in the Powder River basin, is 2½ miles southwest of South Donkey Creek field.

Tristate area busy with new drilling

ILLINOIS BASIN explorationists were busy in Hamilton County, Illinois, and in Gibson and Spencer counties, Indiana, with a discovery reported in Hopkins County, Kentucky.

Illinois . . . Completion is near at H. N. Sanders 2 J. J. Wilson in NW NE SW 26-5s-6e, 2 miles southeast of McLeansboro, Ill.

Drill-stem test at 3,156-96 ft. got 1,385 ft. of oil and 60 ft. heavily oil-mixed mud in the Rosiclare.

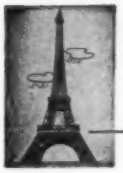
Indiana . . . Highland Oil Co. is testing a wildcat in Gibson County, 4 miles southwest of Oakland City, the 1 Willard Winget, SW SE NE 21-2s-9w.

This new well made 5 bbl. per hour natural from the Cypress at 1,498-1-521 ft., after fracturing.

Also in Gibson County, Arthur J. Fritz is testing the Hardinsburg sand at 1,546-57 ft. at the 1 Richard Lefler, NW SW NE 6-3s-9w, 3 miles south of Francisco. A drill-stem test got oil to the surface.

. . . Spencer County. Cato Enterprises-J. Abele-J. C. Westfall-J. R. Knapp 1 W. G. Machin, SE SW SE 6-7s-5w, 1 mile west of Grandview, was completed on pump for 128 bbl. of oil per day, natural, from the Aux Vases at 1,224-35 ft.

Kentucky . . . Stouder Drilling Co.-Ashland-Sun 1 G. Clements, 20-I-28, Hopkins County, is a new O'Hara discovery. The well got 90 ft. of gas and 750 ft. clean oil on drill-stem test at 1,980-90 ft.



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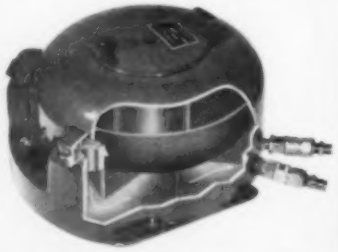

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Rumberger well quits at Elk City

OKLAHOMA'S DEEPEST HOLE, and the world's second deepest penetration, Shell Oil Co. 5 Rumberger in Elk City field, has quit operations at 24,015 ft. to run another string of casing.

This Beckham County wildcat, in the western part of the state, already has two strings in the hole including a 9⅝-in. pipe at 11,505 ft.; and a 7-in. liner at 20,102 ft.

Guymon area pool gets confirmation

CHEROKEE - PENNSYLVANIAN sand production was confirmed by Phillips Petroleum Co. in Texas County, Oklahoma Panhandle. The 2 Wavia, in the south portion of vast Hugoton field Permian gas production, is in SE SW NE 17-1n-15eCM.

Initial gas flow at 5,756-5,815 ft. was 5,690 M.c.f.d. in 8 minutes; the flow rose to 9,500 M.c.f.d. at the end of the test. Recovery included 50 ft. of condensate.

This confirmation well is the sister well to the recent completion at 2 Pearl in C NW NW 16. That discovery flowed 23,200 M.c.f.d. plus 6 bbl. distillate per million from the Cherokee.

Dual strike seen in Newcastle area

HUNTON (SILURO - DEVONIAN) OIL is promised Gulf Oil Corp.'s 1 Bass Newcastle area discovery in McClain County, Central Oklahoma. The well is already a Tulip Creek-Ordovician strike.

Some oil was recovered on test of the Hunton at 9,013-43 ft. Previously, the well got 20 bbl. of 52°-gravity oil per hour on 17/64-in. choke from the Tulip Creek at 10,236-44 ft. plus 3,010 M.c.f.d. of gas.

Cleveland County . . . Petroleum, Inc. completed the 1 Tullius in C SW NE 17-8n-2w, northwest of North Noble field, as a dual discovery in both the Tulip Creek and Oil Creek Ordovician sands. Flow from the Tulip Creek at 8,256-68 ft., natural, was 8 bbl. hourly on 10/64-in. choke; from the Oil Creek at 8,706-10 ft., the flow was 10 bbl. per hour on 10/64-in. choke.

At West Moore, Continental Oil Co. 2 Dreessen, C SW NE 22-10n-3w, flowed 222 bbl. of 39.5°-gravity oil daily from Bartlesville sand perforations between 7,617-78 ft. The Bois d'Arc also had oil shows at 7,770-7,866 ft.

Star-Lite pool opens on Texas Coast

DISCOVERY of a new field east of Eagle Lake in southeastern Colorado County, Texas Gulf Coast, is reported by Starr Oil & Gas Co., of Houston.

Its discovery well, 1 Hoyo, is rated good for 13 M.M.c.f.d. of gas on open-flow potential. Liquid recovery is 52.2°-gravity condensate at the rate of 1 bbl. to 41 M.c.f. of gas. Tubing pressures on choke flows ranged from 2,876 to 3,102 psi.

Production is from Wilcox sand at 9,550-74 ft. in hole drilled to 9,675 ft.

Location is about a mile from town and from nearest production in Eagle Lake field. "Star-Lite" is proposed as the name for the new field.

First oil promised Bull Mountain

THE CENTER of Central Montana's Bull Mountain basin may have its first production. Miles Jackson swabbed at the rate of 22 bbl. of oil with 3% acid water from perforations at 7,079-99 ft. at 1 Northern Pacific-McConnell, Lot 24, 1-8n-29e, Musselshell County.

Production is from the Amsden of basal Pennsylvanian age. There has been little drilling in this sector of the basin; production in Bull Mountain is confined to the extreme flanks. Wolf Springs field lies to the southeast, Delphia field to the northwest. Here is a new basin to watch in the Rockies.

Possible new field for Calhoun County

A NEW OIL FIELD, or a major extension of North San Antonio Bay field at the north end of San Antonio Bay, in Calhoun County, Texas Gulf Coast, is evident in a discovery well being completed by Shoreline Petroleum Corp. and Blanco Oil Co.

The well, 1 Lockwood, Andrews & Newman, is about a mile north of nearest gas-condensate production in North San Antonio Bay field, and about 2 miles north of the same field's nearest oil producer. Present production in the field is offshore in the bay. The new producer is on

shore. It is about 2 miles northwest of Seadrift.

Production is from Frio sand at 7,826-30 ft. Its flow gaged 196.67 bbl. per day through 9/64-in. choke. Gas-oil ratio was 271 cu. ft. per bbl., and pressure 1,450 psi. Total depth is 8,520 ft.

Union Oil Co. of California is getting ready to test another indicated discovery well 2 miles south of production in North San Antonio Bay field. Its location is in Tract 65, in the bay. It has been drilled to 10,525 ft., and has oil string run to 10,000 ft.

Two-pay production opens in Panhandle

DUAL PRODUCTION was established by Shell Oil Co. at its 1 J. H. Kershaw in north-central Ochiltree County, Texas Panhandle.

The well flowed 10,200 M.c.f.d. of gas and 24½ bbl. distillate per million from Chester at 8,142-64 ft.; from the Morrow-Pennsylvanian at 8,142-64 ft. it pumped 64 bbl. of oil per day.

Location is 5 miles northeast of the town of Perryton and 4½ miles east of Perryton field.

Southwest Bisti to get deep hole

AN ULTRA-DEEP Pennsylvanian wildcat is planned on the Carson Unit in San Juan County, San Juan basin, northwestern New Mexico by Shell Oil Co.

The 12,000-ft. try is reportedly located in NW SW 17-25n-11w. This well site is at the southwest end of the Bisti-Carson Gallup sand trend. There has been no deep drilling in the area; in the basin there has been little drilling below established pay zones.

Port Acres spreads

PRODUCTIVE area of the prolific Port Acres gas-condensate field north of Port Arthur, in southeastern Jefferson County, Texas Gulf Coast, spread northwestward last week.

The new extension is by Meredith & Co., field discoverer, at its 2 Lum Edwards. The well is completed in the field's lower Hackberry sand, perforated at 10,598-10,612 ft. Its calculated open-flow potential is 48 M.M.c.f.d. of gas with a gas-condensate ratio of 19,810 cu. ft. per bbl. Gravity of the liquid is 52.2°. Shut-in tubing pressure is 7,161 psi. Hole was drilled to 11,168 ft.

Terrebonne Parish gets second strike

COASTAL LOUISIANA'S active Terrebonne Parish has its second new-field discovery within 2 weeks and the eighth this year.

It is by California Co. at its 1 Louisiana Land & Exploration Co., a deep wildcat 3 miles south of Bayou Piquant field in the parish's marshlands.

It is about 5 miles north of a discovery well completed the previous week by Union Oil Co. of California.

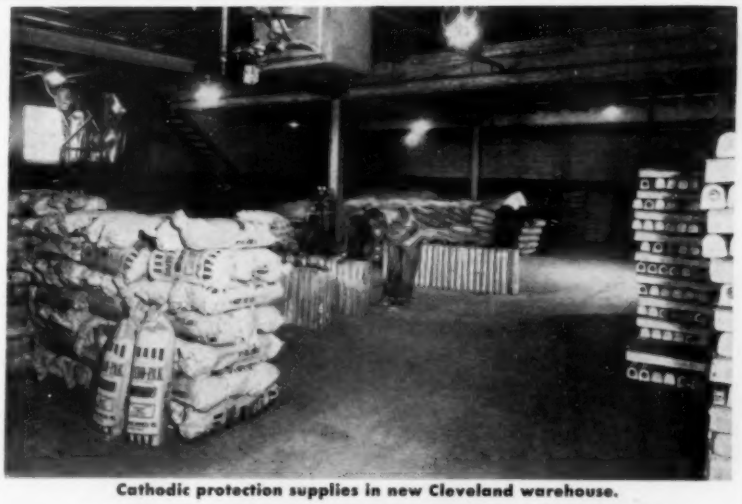
California Co.'s new well, drilled to 14,028 ft., is productive of gas and condensate at 10,394-10,412 ft. It tested 2,040 M.c.f. of gas and 33 bbl. of 52.2°-gravity liquid per day, flowing through 5/32 in. choke.

Union's well, 3½ miles southwest of Lake Decade field, flowed dry gas at 12,122-35 ft.

Six other new-field discoveries in the parish this year are shown on page 140.

West Texas has new Grayburg discovery

West Texas has a new Grayburg sand oil discovery area about 20 miles



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southeast of Bakersfield in remote producing area. The discovery well is Curtis R. Inman 1 J. G. Nutt, west-central Pecos County.

This good producer flowed 157 bbl. of 26.6°-gravity oil in 7 hours on choke. Calculated daily flow was 541 bbl. Production is from open-hole section at 2,380-2,407 ft. Spot is in Section 5, Block 180½, TCRR Survey, A-7200.

Madison tested in Montana's Glacier

The Madison-Mississippian drilling spurt in northwestern Montana gained another stepping stone last week. Salt Dome Production Co. got 700 ft. of clean oil on test of the Madison at the 1-A Moberly in C SW SW 1-37n-5w, Glacier County.

The test was at 2,793-2,805 ft. Other wells in the area have tested or are testing the Madison.

Gas discovery in Buckeye's Holmes

IN OHIO, W. H. Patton et al., announced the discovery of a gas pool southwest of Nashville in Knox Township, Holmes County.

The test, on G. Gingery, Section 22, logged Clinton sand at 2,981-3,016 ft. with 2,380 M.c.f. natural and is to be fractured. Gas pools in the area are usually of limited extent.

Wilcox produces in Texas' Victoria

WILCOX SAND is proving productive in a wildcat drilled by Harkins & Co., of Alice, Tex., in northwestern Victoria County, Texas Gulf Coast. Location is 2½ miles west of Nursery, near the Goliad county line.

Harkins' well has an open-flow potential rating of 2 M.M.c.f.d. of gas, yielding 40 bbl. of high-gravity condensate per 1 M.M.c.f. Flowing pressure through ⅛-in. choke was 2,700 psi. Its pay is perforated at 9,510-16 ft. with bottom of hole at 9,523 ft.

This is another in a succession of Wilcox discoveries this year along a trend through northern Victoria and southern DeWitt counties. The well is about 2½ miles south of the DeWitt county line.

Mead opener completed in Nebraska's Banner

The discovery well of Mead field was completed in Banner County, Nebraska. This new Denver basin field opener is Braden Drilling Co. 1 Mead-C, SE NE SW 33-20n-55w.

Pump gage was 50 bbl. daily from "J" sand Dakota Cretaceous through perforations at 5,462-68 ft. Location is 3½ miles north of Davis field.

Halley field gets second Ellenburger well

Halley field, a Winkler County, West Texas, Ellenburger producer, gained its second Ellenburger well. The new addition is Richardson Oils, Inc. 9 Mrs. M. J. Hill, 8 miles southeast of Wink.

The good producer, located ½ mile northwest of other Ellenburger production, flowed 476 bbl. of 41.1°-gravity oil daily on ⅜-in. choke from open-hole section at 12,078-12,120 ft. The well spots in Section 23, Block B-11, PSL Survey.

Rio Arriba County opens gas production

Dakota gas production was opened in Rio Arriba County at a Skelly Oil Co. wildcat in the San Juan basin. The northwestern New Mexico strike is the 1 Farming-E, SW NE NE 2-24n-6w.

Completion was 3,050 M.c.f.d. of

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gas on 24/64-in. choke from perforations at 6,924-75 ft. Location is west of Largo Canyon field Pictured Cliffs production.

New Texas pools set up by TRRC

THE TEXAS Railroad Commission set up 26 new oil pools for District 9, North Texas, during the third quarter of this year. There were four new fields in Archer, Montague, and Wise counties; Cooke and Grayson each had three. Two new pools were opened in each of these counties: Jack, Knox, and Young. Baylor and Clay counties each had one new producing area.

Archer County . . . Archer City Southeast (Mississippian) pool was opened by L. T. Burns estate at 5 Herron with top of pay at 5,394 ft. Potential of the discovery well was 147 bbl. of 42°-gravity oil daily.

- Lofton Caddo pool was opened by Burk Royalty Co. at 1-A Laura B. Moody with top of pay at 4,906 ft. Potential was 150 bbl. per day, 42° gravity.
- Ray Jones Conglomerate pool was opened by J. R. Todd at 1 Ray Jones with top of pay at 5,406 ft. Potential was 126 bbl. of 40.8°-gravity oil per day.
- Threet Mississippian pool was opened at TGT 1 E.E. Threet, top of pay being 5,251 ft. Potential was 127 bbl. of 41°-gravity oil daily.

Baylor County . . . Rendham Northwest Mississippian pool was opened at Bobby M. Burns estate 1 Melear Unit with top of pay at 5,448 ft. Potential was 111 bbl. of 42°-gravity oil daily.

Clay County . . . Sanzenbacher Mississippian pool was opened by the 4-B Trust at 1 Sanzenbacher "F" with top of pay at 5,954 ft. Potential was 129 bbl. of 41°-gravity oil per day.

Cooke County . . . Prince Strawn pool was opened by C. C. Parfet et al. at 10 J. F. Bugg "B," top of pay at 2,940 ft. Potential was 92 bbl. of 39°-gravity oil per day.

- Woodbine 4,525-ft. sand pool was opened by Star Oil Co., Inc. at 4 Coleman-Fitzgerald with top of pay at 4,525 ft. Potential was 120 bbl. of 29°-gravity oil daily.
- Woodbine North field was opened by Star at 1 J. M. Hawkins with top of pay at 4,570 ft. Potential was 110 bbl. of oil per day, 27° gravity.

Grayson County . . . Big Mineral Southeast "V" sand pool was opened by Shell Oil Co. at 1 N. L. Ferrill with top of pay at 8,074 ft. Potential was 216 bbl. of 37°-gravity oil daily.

- Sadler 5,970-ft. sand pool was opened by Sinclair at 2 J. E. Anderson with top of pay at 5,971 ft. Potential was 70 bbl. of 35.4°-gravity oil per day.
- Sherman 9,300-ft. sand Ordovician field was opened by H. L. Hunt at 2 Joe Robertson. Top of pay is 9,329 ft. Potential was 212 bbl. of 39.7°-gravity oil daily.

Jack County . . . Avis East Bend Conglomerate field was opened by Sunray at 1 H. B. Sewell with top of pay at 5,573 ft. Potential was 72 bbl. of 44°-gravity oil daily.

- Winn Mississippian pool was opened by Ralph Harper at 1 Loving. Top of pay is at 5,290 ft. Potential is 135 bbl. of 43°-gravity oil daily.

Knox County . . . Munday East Tannehill pool was opened by Paragon Corp. 1 Rhoda Reeves with top of pay at 1,960 ft. Potential was 48 bbl. of 36°-gravity oil per day.

- Two Tee Tannehill pool was opened by Katz Oil Co. at 2-T McFaddin estate with top of pay at 2,570 ft. Potential was 190 bbl. of 36.8°-gravity oil per day.

Montague County . . . Fleming Strawn pool was opened by Ratcliff Operating Co. at 1 A. Fleming with top of pay

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at 3,374 ft. Potential was 120 bbl. of 40°-gravity oil daily.

● Haralmar Strawn field was opened by Marshall Pipe & Supply Co. at 1 C. C. Haralson with top of pay at 2,863 ft. Potential was 78 bbl. of 39°-gravity oil daily.

● Lerner First Conglomerate pool was opened at Eureka Oil Co. 1(C) M. C. Lerner with top of pay at 5,227 ft. Potential was 126 bbl. of 42°-gravity oil per day.

● Mallard North Conglomerate pool was opened by The Texas Co. at 1 John Raymond with top of pay at 6,746 ft. Potential was 167 bbl. of 38.6°-gravity oil daily.

Wise County . . . Bridgeport Lake Caddo pool was opened by Lone Star Producing Co. at 1(C) Craft Water Board Unit 15 with top of pay at 4,453 ft. Potential was 168 bbl. of 42.5°-gravity oil daily.

● Bridgeport Lake 4,600-ft. Conglomerate pool was opened at Lone Star 1(C) Craft Water Board Unit 14 with top of pay at 4,580 ft. Potential was 56 bbl. of 44.2°-gravity oil daily.

● Bridgeport Lake 5,100-ft. Conglomerate pool was opened by Lone Star 1(T) Craft Water Board Unit 15 with top of pay at 5,088 ft. Potential was 170 bbl. of 42°-gravity oil daily.

● Unwise Pennsylvanian pool was opened by W. H. Hudson at 1 Roy Myers with top of pay at 4,580 ft. Potential was 24 bbl. of 42°-gravity oil daily.

Young County . . . River Bend Mississippian pool was opened by J. W. Hastings at 1 Eda Watson with top of pay at 4,356 ft. Potential was 287 bbl. of 45°-gravity oil per day.

● Stovall McLester pool was opened by S. D. Johnson at 1 N. D. Stovall with top of pay at 3,932 ft. Potential was 126 bbl. of 40.4°-gravity oil daily.

Successful Wildcats

CALIFORNIA

Kern County: Reserve Oil & Gas Co. 348-18 "B-W" SE SW 18-11n-19w, 930 BOPD, 32.4° gravity, 1.2% cut, 18/64-in. choke, perfs. 11,162-11,255 ft., 11,284-11,367 ft., 11,396-11,714 ft. and 11,906-12,329 ft. TD 12,432 ft. New fault block discovery midway between the Main and Highway areas of North Tejon field.

WESTERN CANADA

Alberta: Colorado Oil & Gas Co. et al., 16-17 Girouxville, LSD 16, 17-77-22w5. Beaverhill Lake oil discovery. TD 8,030 ft.

SOUTH LOUISIANA

Terrebonne Parish: Union Oil Co. of California 1-S Louisiana Land & Exploration Co., 36-19s-14e, 3½ miles southwest of Lake Decade field. IP 5,300 M.c.f.d., 5/32-in., TP 4,100 psi., perf. 12,122-35 ft. TD 14,500 ft. New field.

California Co. 1 Louisiana Land & Exploration Co. 10, 1-19s-14e. IP 33 BOPD and 2,040 M.c.f.d., 5/32-in., 52.2°, TP 3,700 psi., perf. 10,394-10,412 ft. TD 14,028 ft. New field—South Bayou Piquant.

EAST NEW MEXICO

Eddy County: Joseph I. O'Neill, Jr. 2-D Federal, 12-24s-26e. IP CAOF 3,600 M.c.f.d., Morrow 11,834-80 ft. TD 11,920 ft. Morrow gas discovery.

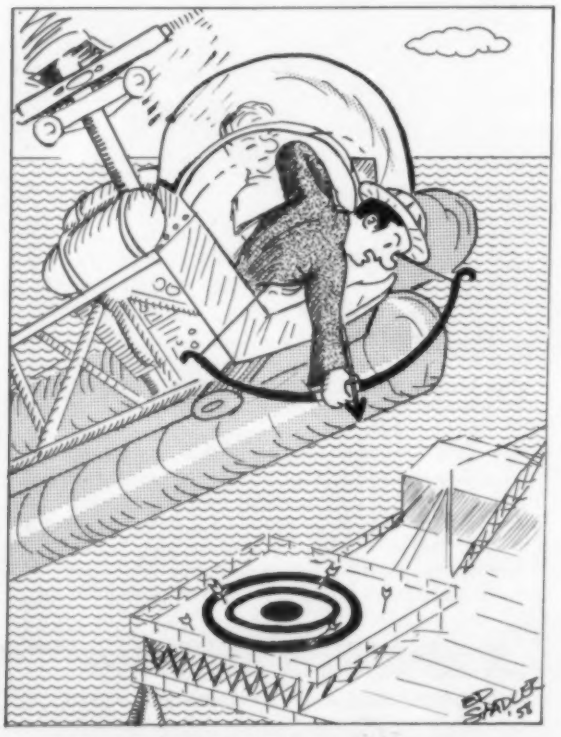
Lea County: Shell Oil Co. 2 Querecho Plains unit, 27-18s-32e. IP 2,250 M.c.f.d., 12,723-12,838 ft., Atoka sand. TD 12,330 ft. Atoka gas discovery.

WEST TEXAS

Garza County: General American Oil Co. of Texas 1 Susie Koonsman, 9 miles southwest of Justiceburg 5-2-T&NO. IP 333 BOPD, 8/64-in. choke, 40°, Ellenburger top pay 8,175 ft., open hole; IP 406 BOPD, ¼-in. choke, 40.8°, Strawn 7,787-7,807 ft. TD 8,195 ft. Dual oil discovery.

Nolan County: J. C. Hunter 1 A. L. Hogue, 11 miles east of Sweetwater, 48-20-T&P. IPP 51 BOPD, 40°, Noodle Creek 2,916-25 ft. TD 6,135 ft. New oil discovery.

Runnels County: Skelly Oil Co. 1 A. M. Underwood, 4 miles southeast of Norton, 13-H&GN, IP 740 M.c.f.d., Palo Pinto 4,670-78 ft. TD 5,132 ft. New gas discovery.



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September field-well depth breakdown

	OIL WELLS									GAS WELLS									DRY HOLES								
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
Alabama							5																				
Arkansas	1	32	18	1							1			4						1	21	1	2	2			
California	11	8	9	4	7	4	2	2				1							1		1		4	1	2		
Colorado			3	2	8									8					2			4	10				
Illinois	14	37	59																12	29	62						
Indiana	5	25	2																12	19	3						
Kansas		31	69	40	3						4	14	6	1						11	64	36	2				
Kentucky	14	30									7								22	22	6						
Louisiana	16	48	11	4	12	22	21	5	3		7	5	2	2	2	3			4	10	11	9	7	10	19	7	
North	11	46	11		3	1	1				7	5	2	2	2				4	5	10	6	5	1	1	1	
South	5	2		4	6	15	16	5	1							2				5	1	3	1	9	15	5	
Offshore					3	6	4		2							1							1		3	1	
Michigan		3	4	3															1	2	3	1					
Mississippi				1	5	1	6															1			2		
Montana	1	2	3	1	3	9														1	1	1	1	2			
Nebraska				1	23																		8				
New Mexico		10	14	19	14	1	2				3	10	4	22						2	3	4	1		1		
West		3	3		9						3	9	4	22						1		1	1				
East		7	11	19	5	1	2					1								1	3	3			1		
New York		21										1															
North Dakota			13		3	6	1														2	1	2	2			
Ohio	4	2	12	2						1	5	4	2						4	5	5	4					
Oklahoma	55	100	65	22	23	18	5			2	2	2	4	11	4				42	45	33	14	12	4			
Pennsylvania		6	3									5		4						3			3				
Texas	110	150	239	94	132	49	13	4	1		23	22	10	15	4		1		47	85	48	36	48	26	9		
District 1	15	12	9	6										1					3	10	1	1	1				
District 2	2		2	1	4	4						2	3	1						1	2	2	4	8	2		
District 3	2	4	8	5	6	16	1		1			2							7	6	4	2	6	4	3		
District 4	5	5	9	1	6	1						3	2	2						3	4	2	13	7			
East	14	9	12	2	14	7									1				3		1	4	13				
District 7-B	30	21	11	11	15														13	27	10	6	2				
West	3	28	125	57	67	16	12	4				2					1		2	5	10	7	2	5	4		
District 9	39	69	21	10	13						1		1	10					19	32	12	11	6				
District 10		2	42	1	7	5					22	13	4	1	3					1	4	1	1	2			
Utah					14	1				1				1													
West Va.		4	3								32	10	7	1						7	2	1	1				
Wyoming	13	2	7	4	7	3	1	1				2			4				7	2	4	1	3	1			
Total United States	**244**	**511**	**534**	**198**	**254**	**114**	**56**	**12**	**4**	**4**	**84**	**76**	**35**	**69**	**14**	**3**	**1**		**154**	**244**	**269**	**114**	**104**	**48**	**33**	**7**	
West Canada		6	4	64	34	7	1					1	1	3						3	2	7	1				
Alberta		3	2	25	34	7	1					1	1	3						2	2	1	1				
Saskatchewan			2	38																1		6					
Manitoba		3																									
British Columbia				1																							

NOTE: A = 0-1,250 ft.; B = 1,250-2,500 ft.; C = 2,500-3,750 ft.; D = 3,750-5,000 ft.; E = 5,000-7,500 ft.; F = 7,500-10,000 ft.; G = 10,000-12,500 ft.; H = 12,500-15,000 ft.; I = 15,000 ft.

Top Vickers Man Moves Fast

. . . with big expansion program. Jack Vickers pioneers petrochemistry in Kansas, steps up refining, marketing.

YOUNG MEN who are going places in a hurry don't look back as much as they look ahead.

But if J. A. (Jack) Vickers would steal a glance over his shoulder at the 6 years since he became president of Vickers Petroleum Co., Inc., he would find a mountain of achievement.

For in that period, the Wichita, Kans., firm has blossomed into one of the nation's fastest-moving independent oil companies.

Besides giant strides in refining, marketing, and drilling, the family-owned company began the first petrochemical manufacturing facility built by an oil company in Kansas.

Behind the big push for complete integration is energetic, 33-year-old Jack Vickers who believes that wise management, expansion, and investment are the keys to a better future.

Vickers has never forgotten the sound and emphatic advice of his father, the late J. A. Vickers, Sr., who founded the company in 1918. He recalls his father saying: A top oil-company executive must participate in all phases of the business.

Jack Vickers' forward look was recognized recently by Esquire magazine which named him one of America's 16 "Bright Young Men in Business."

Last year, fellow oil men in Kansas paid tribute to Vickers by naming him "Oil Man of the Year."

The big push . . . Vickers became president in 1952, and that year marks the real beginning of an expansion program which is still going strong.

First step in the well-planned program was completion of a $500,000 products line to link the company's Potwin, Kans., refinery to the Great Lakes pipeline. This opened new markets for Vickers in the Dakotas, Minnesota, and Chicago.

Attention was then focused on the refinery itself. The plant was almost completely redesigned around a $4-million Thermafor catalytic-cracking unit which boosted capacity to about 16,000 bbl. daily.

At the same time, exploration and drilling activity was speeded up. The company participated in the drilling of the discovery well which opened Anderson Ranch field in Lea County, New Mexico. In 1953, Vickers organized Vickers Explorations, Ltd.

Growth in refining and exploration was paralleled by market expansion. In 1952, sales increased 88.5%. This growth continued at an amazing pace. Sales climbed 36.7% in 1953, and the following 2 years, annual gains were more than 20%.

Two years ago the company helped stabilize its marketing program by building controlled retail outlets. Then last year, Vickers bought Kent Oil Co., which included 26 retail outlets and five bulk plants.

Petrochemistry . . . A $1-million Ultraformer was completed at the

▶ ▶ ▶ Personals

T. W. Koch, chief geologist, and **Leo van der Harst,** senior geologist in Superior Oil Co.'s foreign department, have resigned to join **E. B. Noble** and **L. H. Metzner** in E. B. Noble & Associates, Los Angeles consulting firm.

Fred M. Fehsenfeld, Crystal Flash Petroleum Corp., Indianapolis, has been elected president of the Indiana Independent Petroleum Association. He succeeds **Fred Wilder,** Boonville independent. Other officers are **J. Arnold Jones,** Everybody's Oil Corp., Anderson, vice president; **Emmett Farmer,** Capital Oil Co., Camby, treasurer, and **Stephen Fleener,** executive secretary.

Frank J. Roberson, president of S. & R. Gas Co., Coushatta, La., has been named a director of Titan-Tex Drilling & Production Corp.

John H. Starbird, former directing engineer in Salvador, Bahia, Brazil for Drilling & Exploration Co., has joined Hudson Gas & Oil Corp. as district engineer in Beverly Hills, Calif.

Norman S. Morrisey, drilling-development editor of The Oil and Gas Journal, has resigned to open consulting offices in Tulsa. He will concentrate on northern Oklahoma activity. Morrisey was geophysical coordinator for Pan American Petroleum Corp. (then Stanolind Oil & Gas Co.) before joining the Journal in 1954.

W. J. A. Johnson, Kewanee Oil Co., has been elected 1959 president of Tri-State Landmen's Association. Also elected are **Ivan E. Collier,** Felmont Oil Corp., vice president, and **Arthur L. Hart,** Sun Oil Co., secretary-treasurer.

Kenneth L. Bishop, superintendent of the Gray, Okla., station of Natural Gas Pipeline Co. of America, has been transferred to Texas Illinois Natural Gas Pipeline Co., an affiliate, as superintendent of the Conroe, Tex., station. He succeeds **Charles L. Cochran,** who has resigned. **Vernon L. Ebeling** will succeed Bishop at Gray. Also, **Ted Cheuvront** has been named superintendent of Natural Gas Pipeline's Mountain View, Okla., station.

Potwin refinery in 1957. This became the initial phase of the company's petrochemical operations.

Last June, a $3,500,000 petrochemical complex came into being when a new Udex extraction unit went on stream to produce the first benzene ever manufactured in Kansas.

The company's new chemicals division is expected to produce more than 15 million gallons of benzene, toluene, zylene, and other heavier petroleum aromatics annually.

From the ground up . . . After completing his studies at the University of Oklahoma at the age of 24, Jack Vickers joined the company as a scout.

Shortly after he joined the land department, Vickers and Globe Oil & Refining Co. discovered Golden Antioch pool in Garvin County, Okla.

Vickers was named assistant to the vice president in the land department in 1949. A year later he became vice president and assistant to the president, and finally president in 1952.

His activity is not limited to the company. Vickers is a member of the board of the American Petroleum Institute and vice president and board member of Independent Petroleum Association of America, Kansas Independent Oil and Gas Association, Mid-Continent Oil and Gas Association, and Western Petroleum Refiners Association.

Last year, when Gov. George Docking of Kansas formed his oil advisory committee, he picked Vickers to head the group.

A right-hand man in the Vickers team is Jack's brother James, 30, board member and vice president of crude purchasing, pipeline, and marketing.

J. H. Clement has been appointed division stratigrapher in Billings, Mont., for Shell Oil Co. He succeeds **R. G. Swanson** who has been transferred to Midland, Tex.

Wallace R. Richman, formerly with Standard-Vacuum Oil Co. as special assistant to management in Iran, has resigned to become an ownership partner with Chase, Ward, & Gardner Associates, San Francisco management consultants. Richman was with Humble Oil & Refining Co. before joining Standard-Vacuum in 1947. He had been area advisor for the Durban, South Africa, refinery and advisor to the managing director of the Bombay, India, refinery, before going to Iran in 1954.

Robert F. Baldaste, former administrative director of the Whiting, Ind., research laboratories of Standard Oil Co. (Ind.), has been named assistant manager of the company's organization department.

J. Paul (Dick) Jones, Bradford, Pa., president of Pennsylvania Grade Crude Oil Association, has taken on extra duties as executive manager of the association. He succeeds **W. C. Wenzel,** who resigned several months ago.

Thomas W. Pickel, Jr., chemical engineer in Humble Oil & Refining Co.'s catalytic light ends section in Baytown, Tex., has been promoted to senior supervising engineer there. A graduate of Vanderbilt University, Pickel joined Humble in 1951.

S. G. Coultis, Edmonton Pipe Line Co., Ltd., was elected honorary president at the first meeting of Edmonton Pipe Liners Club recently. **D. B. Furlong,** Imperial Pipe Line Co., Ltd., was elected president. Other officers include **G. J. Evans,** Texaco Exploration Co., vice president; **F. A. L. Maclagan,** Imperial Pipe Line, treasurer; and **R. J. Allman,** Edmonton Pipe Line, secretary. Directors are **D. R. Brandt,** Trans-Prairie Pipelines, Ltd.; **K. W. Lloyd,** Rangeland Pipeline Co.; **J. E. Lyle,** Imperial Pipe Line; and **G. L. Spackman,** Producers Pipelines, Ltd.

H. E. Norrick has been elected senior vice president of United Producing Co., Inc., oil and gas subsidiary of the United Carbon Co. **John M. Capito,** Appalachian area gas and oil operations manager for United Producing, and **Cramon Stanton,** manager of exploration, have also been elected vice presidents. **Frank Lindeman, Jr.,** was named executive vice president of the company 2 months ago. **R. W. French,** president of the parent company and United Producing, has been elected president of United Carbon Co., Inc., and vice president of United Rubber & Chemical Co., two other subsidiaries of United Carbon. **A. G. Treadgold,** president of United Rubber & Chemical, and assistant treasurer of the parent company, has been named senior vice president of United Carbon. Also, **John H. McKenzie,** director of research and development for United Carbon and the subsidiaries, becomes vice president of United Carbon and United Rubber & Chemical, and a director of all three subsidiaries. **Harold B. Lawson,** controller of the parent company, has been named a director of the three subsidiaries.

▶▶▶ Personals

HAY

Charles Hay, executive vice president of Royalite Oil Co., Ltd., has been elected president of the company. He succeeds **Ray Althouse,** who resigned several months ago. In other changes, **Roland L. Thompson,** production manager, has been named operations manager and elected a director. Thompson fills a vacancy on the board created by the retirement of **C. U. Daniels,** who was board chairman. No new chairman has been elected. **J. W. Whitaker,** assistant secretary since 1954, has been appointed secretary. **D. J. Morrison,** assistant treasurer, moves up to treasurer. Hay was president of Hi-Way Refineries, Ltd., when it was acquired by Royalite in 1954. He was elected vice president and director of Royalite in 1955 and became executive vice president in 1956. He is also president of Royalite Hi-Way, Ltd., Saskatoon Pipe Line Co., Ltd., Mid-Saskatchewan Pipe Lines, Ltd., and Bituminous Oil Pipeline, Ltd. All are subsidiaries of Royalite. He is also president of Producers Pipelines, Ltd., and Westspur Pipe Line Co. Thompson has been with the company since 1929. He served as Edmonton district field superintendent before becoming production manager in 1952.

H. D. Crider, Muskegon Development Co., has been elected 1959 president of the Oil and Gas Association of Michigan. Other officers are **Harold M. McClure, Jr.,** McClure Drilling Co., Alma, vice president; **William Palmer,** East Lansing, secretary; and **Kurt deCousser,** Socony Mobil Oil Co., Lansing, and **O. H. Kristofferson,** Mount Pleasant geologist, treasurers.

John E. Lawrence, formerly with Gulf Oil Corp., has joined Illini Oil Co., Tulsa, as general manager and assistant to the president. **James E. Shoup,** engineer with Illini, has been appointed general superintendent of production and field operations. **John E. Sartin** has joined the company as chief geologist. Lawrence and Sartin are graduates of the University of Oklahoma. Shoup is a graduate of Milwaukee School of Engineering. He was with Schlumberger Well Surveying Corp. before joining Illini.

Personals

FENNEBRESQUE

John D. Fennebresque, executive vice president and a director of Food Machinery & Chemical Corp., has been elected president and chief executive officer of Texas Butadiene & Chemical Corp., Houston. He also becomes a director and member of the executive committee. Fennebresque succeeds **E. L. Green,** a vice president of Cabot Carbon Co. and general manager of its oil and gas division. Cabot Carbon is one of the owners of Texas Butadiene. Green has been president of Texas Butadiene since its formation in 1955. He will continue as a director and member of the executive committee. Fennebresque, before joining Food Machinery & Chemical, was a vice president of Celanese Corp. of America, where he served as general manager of the chemical division. He was with the rubber section of the War Production Board during World War II and has served on the chemical and rubber advisory committee of the Department of Commerce.

W. F. (Frank) DeVoe, manager of LPG sales for Phillips Petroleum Co., has been elected president of the National LP-Gas Council. **Frank Carpenter,** United Petroleum Gas Co., was elected chairman of the executive committee, and **James F. Donnelly, Sr.,** A. O. Smith Corp., was named treasurer.

William M. Little, executive vice president of Cascade Natural Gas Co., will join R. A. Ransom Co., Inc., Washington consulting engineers, November 1. He will headquarter in Fayetteville, N.C., as project manager on construction of the North Carolina Natural Gas Corp. system. After completion of the system, Little will join North Carolina Natural as manager of operations.

John W. Uibel, district engineer for Central-Del Rio Oils, Ltd., has been promoted to chief engineer of the company. **Kent Stoddard,** field engineer, moves up to district engineer. A graduate of Montana School of Mines, Uibel joined Central Leduc Oils, Ltd., in 1953 as field engineer. After merger of Del Rio Producers, Ltd., and Central Leduc in 1957, he was transferred to Calgary from Weyburn, Sask. Stoddard, also a Montana School of Mines graduate, joined Central Leduc as a field engineer in Weyburn in 1956. He will continue to headquarter in the Weyburn district office.

G. W. Heid, Shell Oil Co. area geologist, has been named senior geologist in Houston. **R. B. O'Connor, Jr.,** geophysicist in the New Orleans area, has been transferred to Houston in the same capacity. Also, **W. F. Nelson,** exploration engineer in Houston, has been named reservoir engineer in Corpus Christi, Tex. **D. R. Gaumer,** exploitation engineer, has been transferred to Houston from Kilgore, Tex.

James Alvin Howard, project planning group head in Esso Research & Engineering Co.'s planning engineering division, has been named economics group head for Jersey Production Research Co. He moves to Tulsa from Linden, N. J.

Jon T. Moss and **Dr. Philip D. White,** formerly chemical engineers in Magnolia Petroleum Co.'s field research laboratory, have organized Tejas Petroleum Engineers & Laboratory, Dallas consulting firm. They will specialize in thermal recovery.

F. E. Rosenstiehl, The Texas Co., was elected president of the National Lubricating Grease Institute at the group's annual meeting last week. Other officers are **H. A. Mayor, Jr.,** Southwest Grease & Oil Co., vice president; **Dr. J. V. Starr,** Esso Standard Oil Co., secretary, and **A. J. Daniel,** Battenfeld Grease & Oil Co., treasurer. Elected directors of NLGI were Mayor, **S. C. M. Ambler,** British American Oil Co.; **T. W. Binford,** D-A Lubricants; **E. W. Campbell,** Gulf Oil Corp.; **R. Cubicciotti,** L. Sonneborn Sons; **A. G. Griswold,** Cities Service; **F. R. Hart,** Standard Oil Co. of California; **C. L. Johnson,** Jesco Lubricants; **W. A. Magie II,** Magie Brothers Oil Co.; **A. S. Randak,** Sinclair Refining Co.; and **T. F. Shaffer,** Shell Oil Co.

Gordon Simpson, president of General American Oil Co. of Texas, was reelected president of Independent Petroleum Association of America at IPAA's annual meeting last week. **G. W. Anderson,** National Oil Co., was elected vice president for IPAA's new Utah-Arizona area. Other state and area presidents elected were **James A. Nobles, Jr.,** Macfarlane Co., Arkansas; **L. R. Seaman,** Intex Oil Co., California - North; **William A. Boyd,** Kimbark Co., Colorado - Nebraska; **Walter Sargent,** Owensboro independent, Kentucky; **Leonard W. Phillips,** Shreveport, Louisiana-North; **John K. Wright, Jr.,** Jackson, Mississippi; **George J. Sallee,** Felmont Oil Corp., New York-East; and **Herbert G. Officer,** North American Royalties, North-South Dakota. Also, **F. Wayne Fesenmyer,** Minard Run Oil Co., Pennsylvania; **Ralph O. Harvey, Jr.,** Wichita Falls, Texas-North; **Stuart Hunt,** Empire Drilling Co., Texas-North Central; **Jack L. Phillips,** Gladewater, Texas-Northeast; **F. C. Edwards,** Honolulu Oil Corp., Texas-Permian; **N. C. Ginther,** Houston; Texas-Southeast; and **Harry J. Schafer, Jr.,** Schafer Drilling Co., Oklahoma-West.

New staff members at the Whiting, Ind., research laboratories of Standard Oil Co. (Ind.), are **Kenneth W. Kramer, Howard E. Robb,** and **Aivars Kuplis.**

R. B. Gustafson, Jr., senior staff geologist for Delhi-Taylor Oil Corp., has been promoted to assistant chief geologist. **Hugo R. Kamb,** senior staff geologist, has been named senior staff geologist for foreign operations.

GUSTAFSON

KAMB

Gustafson joined the company in 1952. He was district exploration supervisor in Lafayette, La., before moving to Dallas as senior staff geologist in 1957. As assistant chief geologist he will supervise all district exploration supervisors in this country. Kamb joined Delhi-Taylor as senior staff geologist in Dallas in 1955.

Harlan A. Hashbarger, manager of production planning and control for Monsanto Chemical Co.'s organic chemicals division, has been appointed director of divisional planning. **Desmond B. Hosmer,** manager of Monsanto's Anniston, Ala., plant, will move to St. Louis to succeed Hashbarger in production planning and control. Also, **Charles J. Smith,** general manufacturing superintendent at the company's John F. Queeny plant in St. Louis has moved up to manager of the plant. He replaces **Russell L. Miller,** who has been named manager of labor relations for the organic chemicals division. All four are veteran Monsanto employes. Hashbarger and Desmond joined the company in 1937, Smith, in 1942, and Miller, in 1936.

Personals

NORMAN HARDY

Norman Hardy, president of Arabian American Oil Co., has been named chief executive officer. **Fred A. Davies** will continue as chairman of the board. Also, seven Aramco vice presidents have been elected directors of the company. The move is expected to bring field management into greater participation in board affairs. The new directors are **P. H. Arnot, T. C. Barger, R. I. Brougham, R. A. Eeds, R. S. Hatch, J. H. McDonald,** and **L. M. Snyder.** Hardy, new chief executive, became president of the company in January. He joined Standard Oil Co. of California in 1926 and has been with the company's overseas affiliates almost since that time. He was managing director of the old Netherlands Pacific Petroleum Co. and president of Richmond Exploration Co. before moving to Aramco in 1951 as executive assistant to the executive vice president.

Dick Eckhart, senior geologist in Sunray Mid-Continent Oil Co.'s California district, will head the company's new Anchorage, Alaska, exploration office.

W. Raymond Siegart has joined The Texas Co. in Beacon, N. Y., as a chemist. **Stuart C. Jones** has joined Texaco in Port Arthur, Tex., as a chemical engineer.

Forrest G. Baker, regional log analyst for Atlantic Refining Co., has been transferred to Midland, Tex., from Houston.

Bouwe Dykstra, Shell Oil Co. New Orleans area vice president, has been elected president of the Louisiana-Arkansas division of Mid-Continent Oil and Gas Association. He succeeds **A. H. Weyland,** Arkansas Fuel Oil Corp.

J. Howard Corry has been named manager of American Oil Co.'s heavy fuel oil department in New York. He succeeds **H. J. Wylie,** who has retired. **William B. Fenwick** has been named Philadelphia division manager for the company. He succeeds **J. B. Turk.**

Wilbur B. Sherman, vice president and a director of DeGolyer & MacNaughton, has joined Pan American Land & Oil Royalty Co. of Dallas as president. A graduate of the University of California at Los Angeles, Sherman was with Standard Oil Co. of California, Amerada Petroleum Corp., and Superior Oil Co. before joining DeGolyer & MacNaughton in 1948. He was DeGolyer & MacNaughton's senior representative in Brazil while the company was acting as technical advisor for petroleum for the Brazilian Government.

Lee N. Haugen, former vice president and general manager of Cit-Con Oil Corp., has been elected vice president, general manager, and a director of Cities Service Research & Development Co. He succeeds the late Walter W. Scheumann. Haugen joined Cities Service in 1923. He was superintendent of the Ponca City, Okla., refinery, manager of the East Chicago refinery, and general superintendent of the refining division before becoming vice president and manager of refining in 1950. He was elected vice president and general manager of Cit-Con in 1954.

Robert R. Dixon, formerly station superintendent with Texas Illinois Natural Gas Pipeline Co. in Marshall, Tex., has joined Houston Texas Gas & Oil Corp. as chief inspector at its Brooker, Fla., station.

Irving H. Dawes, vice president of Clark Oil & Refining Co., has been named chairman of the newly organized Wisconsin Petroleum Council. **C. H. Coughlin,** regional manager in Milwaukee for Standard Oil Co. (Ind.), is vice chairman.

Deaths

Frank E. Kendrick, 63, chief geologist for Lone Star Gas Co., Dallas, since 1930, died October 28 in Dallas. Kendrick, a graduate of the University of North Carolina, joined Lone Star as a geologist in October 1920.

Don C. Lamb, 66, Wilson, Okla., independent operator, and partner in Lamb Production Co., died recently of cancer. He had been ill for the past year.

Henry B. Davenport, 93, pioneer in oil and gas development in West Virginia and Texas, died October 24 at his home in Charleston, W. Va. A graduate of Rensselaer Polytechnic Institute and the University of West Virginia, Davenport helped organize and served as a director of many companies. Among these companies were Craig Oil Co., Marne Oil Co., Davis Oil Co., Goshorn Oil Co., Eldorado Oil & Gas Co., Clyde Oil Co., and Quincy Oil Co. He was also a director of Plymouth Oil Co. for many years.

Homer O'Neal, 57, Michigan independent contractor and producer since 1930, died October 23 after a long illness.

Howard L. Bass, Southwest Texas oil operator and principal owner of Monte Cristo Drilling Co., died October 22 in Rio Grande City, Tex.

Fred S. Cook, 83, special consultant to the chairman of the board of Sinclair Oil & Gas Co., died October 29 in Tulsa. A pioneer Oklahoma oil man, Cook joined Prairie Oil & Gas Co. in 1915. He was superintendent of the land department when Prairie was merged with Sinclair in 1932. He had been special consultant to the chairman of Sinclair since his retirement 10 years ago.

L. Bernard Davis, 63, president of Petroleum Laboratories, Englewood, Colo., and a director of Empire Petroleum Co., Denver, died recently while in Wallingford, Vt., on business.

Milton A. Lobree, Evansville, Ind., independent producer, died October 16 in an Evansville hospital after a heart attack. He had operated in Evansville since 1938.

Edmond Berger, 71, structural engineer for Refinery Engineering Co., died October 28 in a Tulsa hospital after a heart attack. A graduate of the University of Nebraska, Berger had been with Treco since 1950.

Frank Covert St. Clair, 85, pioneer California oil man, died recently in Bakersfield, Calif. He was the brother of **L. P. St. Clair,** former president and chairman of the board of Union Oil Co.

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Winter demand will be up

. . . but growth should be measured against normal

BY JOHN C. CASPER

OIL MEN have one big question this year. Will sales during the high-demand season this winter pull petroleum out of the slump? The change will have to be in domestic demand since there is little chance of significant gains in exports.

Domestic demand for petroleum was low in the first half of this year. The average was only 0.4% greater than in 1957, and the 1957 average showed no growth over 1956.

Third-quarter demand was up about 2.9% over last year and only 3.8% over 1956.

Fourth-quarter demand was forecast at 9,515,000 bbl. daily last week by the supply and demand committee of the Independent Petroleum Association of America. This total represents a gain of 372,000 bbl. daily or 4.1% over the same quarter last year. However, this gain is calculated from a low base. Fourth-quarter demand last year could not be considered normal. Domestic demand for the period was only 0.9% greater than in 1956 and was less than the record set in the last quarter of 1955.

The projection for the fourth-quarter represents a gain of only 3.8% for the past 3 years or an average of 1.25% a year.

Demand should average about 10,070,000 bbl. daily in the first quarter of next year, according to the IPAA forecast. This total means a gain of 382,000 bbl. daily or 3.9% over the first quarter of 1958. It also shows 3.9% gain over 1957 since the first-quarter totals were the same for both years.

These figures establish the need for a look at more than one comparison in evaluating current demands. Here is an example. When you start checking on domestic demand for distillate in December you may find a good gain over last December and even over December 1956. But, the average may be running less than for the last big December total which was in 1955.

Also, don't be disappointed if distillate demand in February drops below last year, because last February was a banner distillate month. The average for the month was about 20% above the previous February record which was set in 1955.

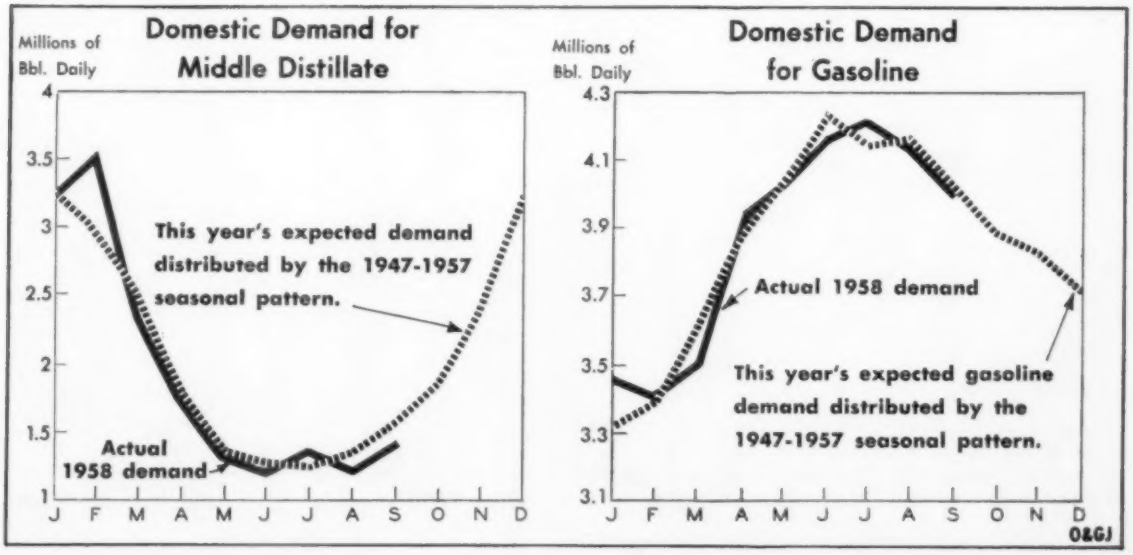
The charts on this page show how demands for gasoline and middle distillate have shifted from normal patterns. Daily average demand for each month of the year is compared with the normal monthly breakdown of the total expected for the year.

Note the peak distillate demand in February and the below-normal averages for August and September. Also, actual gasoline demand in January was higher than would be expected from the normal monthly distribution of the year's expected total.

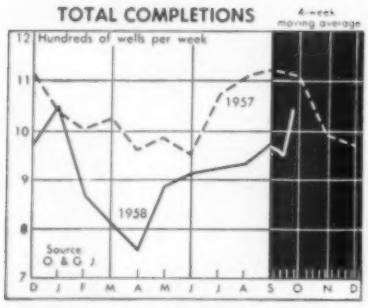
So, a small increase in gasoline demand next January may mean a normal month, and good distillate demands in February may not push that month's distillate average above 1958.

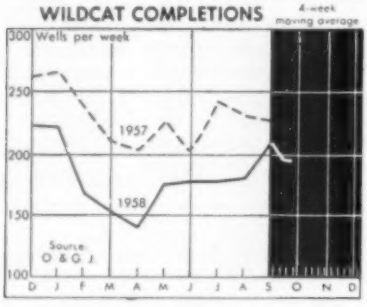
A quick look at the highlights . . .

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,906,625	UP	1,700	UP	43,332
Crude stocks	254,031,000	UP	1,746,000	DOWN	30,847,000
Completions	1,319	UP	288	UP	202
Refinery runs	7,753,000	UP	140,000	UP	104,000
Gasoline stocks	168,350,000	DOWN	2,011,000	DOWN	10,938,000
Kerosine stocks	31,883,000	UP	363,000	DOWN	3,603,000
Distillate stocks	163,916,000	UP	2,575,000	DOWN	11,553,000
Residual stocks	67,854,000	DOWN	166,000	UP	8,389,000
Four-product stocks	432,003,000	UP	761,000	DOWN	17,705,000
Total imports	1,425,600	DOWN	94,700	DOWN	124,600



DRILLING





Active Rotary Rigs*

	10-27-58	10-20-58	10-28-57
Alabama	13	11	6
Arkansas	29	24	23
Arizona	2	2	1
California	73	71	84
Colorado	27	37	52
Florida	1	1	1
Georgia	....	....	....
Idaho	....	....	....
Illinois	55	60	50
Indiana	11	10	7
Iowa	3	3	2
Kansas	146	142	137
Kentucky	14	7	11
Louisiana	311	296	407
North	36	36	63
South	242	227	264
Offshore	33	33	80
Maryland	1	1	1
Michigan	11	13	13
Missouri	1	1	....
Montana	28	28	37
Mississippi	59	58	41
Nebraska	20	24	26
Nevada	....	....	....
New Mexico	84	99	136
New York	2	2	....
North Dakota	29	32	41
Ohio	4	2	1
Oklahoma	223	233	230
Oregon	....	....	1
Pennsylvania	9	8	13
South Dakota	1	1	1
Texas	744	745	839
South-Gulf	151	165	159
Offshore	....	....	7
North-East	167	166	(†)
West Central	255	249	(†)
West	171	165	(†)
Tennessee	....	....	....
Utah	41	41	54
Washington	1	....	1
West Virginia	5	3	3
Wyoming	66	63	78
Virginia	....	....	....
Total U. S.	**2,014**	2,018	2,297
Western Canada	147	140	179
Eastern Canada	3	3	3
Grand total	2,164	2,161	2,479

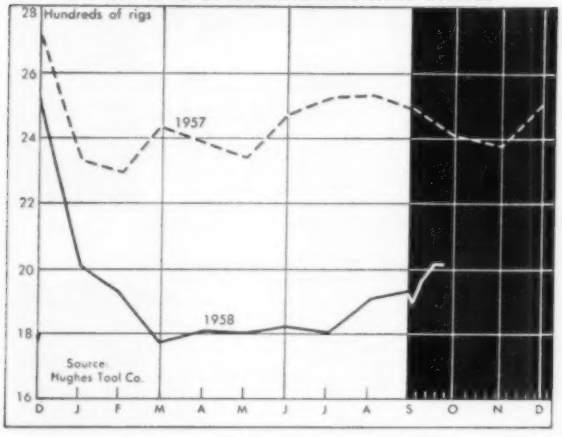
*Hughes Tool Co. †Comparisons not available due to change in method of reporting.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED OCTOBER 25, 1958

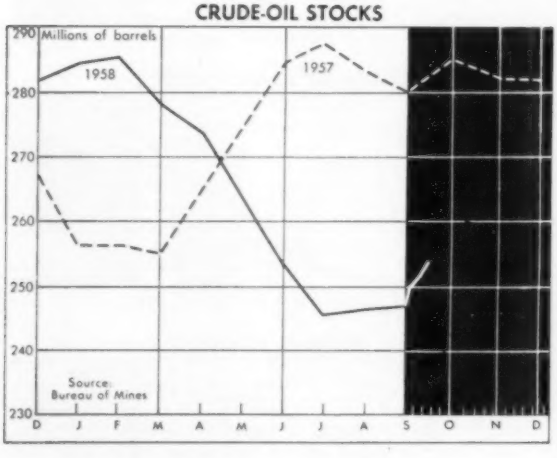
	Total	Crude	Cond.	Gas	Dry	Service	Footage	Cumulative 1958	Cumulative 1957	Total wildcats	Crude	Cond.	Gas	Dry	Cumulative 1958	Cumulative 1957
Alabama	0	0	0	0	0	0	0	62	67	0	0	0	0	0	24	21
Arkansas	23	16	0	0	6	1	73,067	646	909	2	0	0	0	2	134	169
California	25	14	0	0	11	0	143,921	1,255	1,815	7	1	0	0	6	303	437
Colorado	24	8	0	3	13	0	128,255	684	696	11	1	0	1	9	397	457
Illinois	37	16	0	0	21	0	86,649	1,840	2,204	8	2	0	0	6	369	518
Indiana	35	16	0	2	17	0	60,293	672	554	7	1	0	2	4	242	109
Kansas	92	45	1	4	41	1	313,120	3,137	3,467	14	2	0	1	11	658	696
Kentucky	*449	425	0	2	22	0	235,180	*1,401	1,239	8	0	0	0	8	133	249
Louisiana	56	23	3	2	28	0	413,113	2,805	3,175	17	2	2	0	13	422	565
North	28	11	0	1	16	0	110,315	1,063	1,172	10	2	0	0	8	181	160
South	18	4	3	1	10	0	204,461	1,385	1,435	6	0	2	0	4	217	333
Offshore	10	8	0	0	2	0	98,337	357	568	1	0	0	0	1	24	72
Michigan	10	3	0	0	7	0	23,593	354	362	4	0	0	0	4	116	128
Mississippi	10	3	0	0	7	0	93,905	315	320	4	0	0	0	4	144	164
Montana	9	5	0	0	4	0	25,649	273	342	2	0	0	0	2	109	136
Nebraska	13	1	0	0	12	0	79,335	588	745	9	1	0	0	8	276	409
New Mexico	45	14	0	15	10	6	180,983	1,598	1,780	7	0	0	0	7	220	232
West	22	5	0	15	2	0	80,596	783	754	1	0	0	0	1	89	90
East	23	9	0	0	8	6	100,387	815	1,026	6	0	0	0	6	131	142
New York	7	4	0	0	0	3	9,450	445	372	0	0	0	0	0	39	7
North Dakota	14	8	0	0	6	0	114,816	384	236	4	1	0	0	3	122	106
Ohio	17	8	0	2	5	2	39,437	838	927	0	0	0	0	0	12	16
Oklahoma	109	59	0	8	37	5	381,473	5,182	5,274	13	2	0	1	10	708	616
Pennsylvania	0	0	0	0	0	0	0	473	519	0	0	0	0	0	16	41
Texas	308	150	6	10	136	6	1,217,764	14,632	17,946	67	2	1	1	63	2,999	4,270
Dist. 1	17	6	2	0	9	0	66,569	812	1,024	6	0	0	0	6	323	347
Dist. 2	12	2	1	0	9	0	51,744	615	636	0	0	0	0	0	160	224
Dist. 3	25	8	1	2	14	0	165,836	1,039	1,400	7	0	1	0	6	234	397
Dist. 4	19	3	0	0	16	0	84,404	945	1,156	8	0	0	0	8	286	372
East	18	10	0	0	8	0	86,470	997	1,113	5	0	0	0	5	277	320
Dist. 7-B	50	22	1	0	26	1	128,720	2,012	2,441	14	2	0	0	12	566	830
West	74	44	1	1	28	0	376,321	4,171	5,069	16	0	0	1	15	589	721
Dist. 9	73	43	0	2	23	5	183,003	2,970	3,918	9	0	0	0	9	474	968
Dist. 10	20	12	0	5	3	0	74,697	1,071	1,189	2	0	0	0	2	100	91
Utah	4	3	0	0	1	0	22,728	306	190	1	0	0	0	1	74	97
West Virginia	21	3	0	16	2	0	59,633	615	571	1	0	0	1	0	15	28
Wyoming	10	3	0	1	6	0	40,725	614	716	5	1	0	0	4	195	246
Miscellaneous (Ariz.)	1	1	0	0	0	0	5,410	79	114	1	1	0	0	0	69	97
Total U. S.	*1,319	828	10	65	392	24	3,748,499	*39,198	44,530	**192**	17	3	7	165	7,796	9,814
Total prev. wk.	1,031	487	21	87	400	36	4,181,855	.....	.....	211	18	5	2	186	.....	.....
Cum. 1958	39,198	19,305	915	2,944	14,995	1,039	159,957,245	.....	.....	7,796	759	133	212	6,692	.....	.....
Western Canada	60	42	0	1	17	0	323,248	2,015	2,509	13	1	0	0	12	533	708

*Incl. 400 oil wells in Greensburg area—data just now available.

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

	10-18-58	10-11-58	10-19-57
Pennsylvania	2,767	2,837	3,131
Other Appachian	1,809	1,867	1,821
Illinois, Indiana, Michigan	9,356	9,407	10,904
Nebraska and North Dakota	2,920	3,150	3,015
Kansas	9,708	9,147	10,417
Oklahoma	17,107	16,873	20,441
Arkansas	1,990	1,879	2,341
Louisiana	17,306	16,974	19,258
North	2,933	2,911	3,045
South	14,373	14,063	16,213
Mississippi, Alabama, Florida	2,551	2,534	2,538
New Mexico	8,212	7,980	9,917
Texas	108,819	106,304	128,103
East Texas	8,066	7,874	9,365
West Texas	53,246	52,213	59,555
Texas Gulf	19,617	19,840	25,356
Other Texas	27,890	26,377	33,827
Wyoming	13,196	13,622	15,145
Other Rocky Mountain	9,399	9,653	6,584
California	33,134	34,093	32,568
Foreign	†15,757	15,965	18,695
Total	**254,031**	252,285	284,878

*Bureau of Mines. †Includes 5,716,000 bbl. in California.

DAILY AVERAGE PRODUCTION FOR WEEK

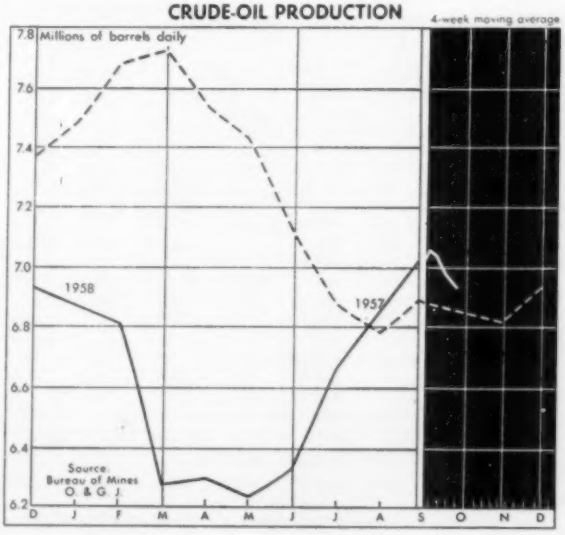
	October 25, 1958			
	Crude oil	Lease condensate	Total	Oct. 18 total
Alabama	16,300	.....	16,300	16,250
Arkansas	79,500	150	79,650	74,575
California	849,400	.....	849,400	850,800
Colorado	131,200	.....	131,200	130,900
Eastern	44,500	.....	44,500	46,000
Florida	1,200	.....	1,200	1,200
Illinois	217,200	.....	217,200	230,600
Indiana	32,900	.....	32,900	33,300
Kansas	†337,700	.....	†337,700	†335,675
Kentucky	41,700	.....	41,700	41,900
Louisiana	809,800	89,900	899,700	899,650
North	109,800	3,500	113,300	113,250
South	700,000	86,400	786,400	786,400
Michigan	25,200	.....	25,200	26,900
Mississippi	105,100	4,400	109,500	109,500
Montana	77,000	.....	77,000	77,400
Nebraska	57,800	.....	57,800	57,500
Nevada	100	.....	100	100
New Mexico	277,100	6,000	283,100	283,100
North Dakota	19,000	.....	19,000	11,500
Oklahoma	†561,800	.....	†561,800	†560,400
Texas	2,620,000	63,200	2,683,200	2,683,200
Dist. 1	47,000	500	47,500	47,500
Dist. 2	116,000	8,300	124,300	124,300
Dist. 3	342,000	31,000	373,000	373,000
Dist. 4	194,000	7,800	201,800	201,800
Dist. 5	31,000	400	31,400	31,400
Dist. 6	120,000	6,800	126,800	126,800
East Texas field	149,000	.....	149,000	149,000
Dist. 7-B	144,000	50	144,050	144,050
Dist. 7-C	138,000	4,050	142,050	142,050
Dist. 8	1,022,000	2,000	1,024,000	1,024,000
Dist. 9	210,000	1,500	211,500	211,500
Dist. 10	107,000	800	107,800	107,800
Utah	109,500	.....	109,500	104,800
Wyoming	328,800	.....	328,800	329,500
Others	‡175	.....	‡175	‡175
Total U. S.	6,742,975	163,650	**6,906,625**	6,904,925
Change from previous week, down			**2,700**	
Change from previous week, up			**1,700**	

Total U. S. production—January 1-October 25 ... 1,970,685,250

Same period last year (crude plus cond.) ..... *2,156,697,879 bbl.

*Includes 41,630,065 bbl. condensate. †Week ended previous Monday. ‡South Dakota and Washington.

CRUDE-OIL PRODUCTION



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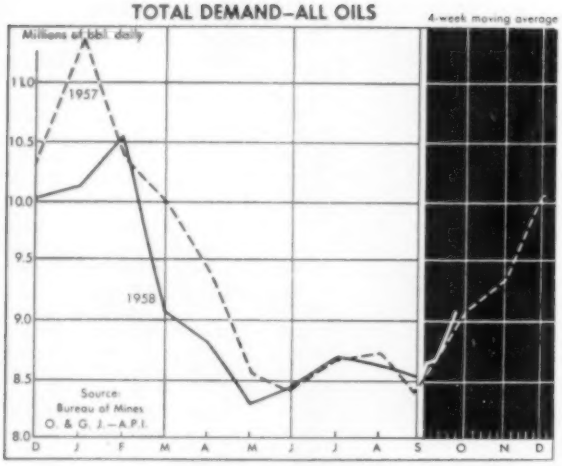

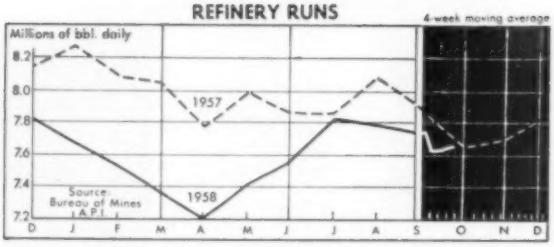

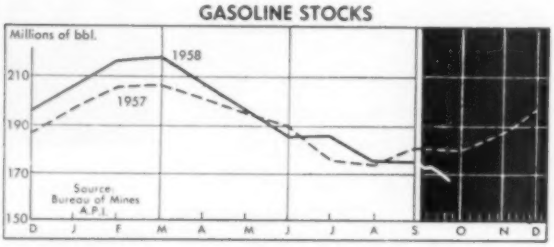

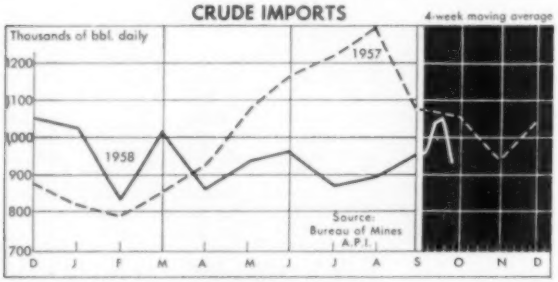

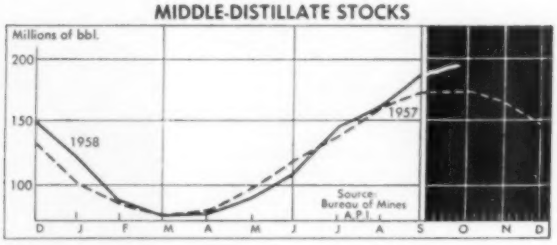

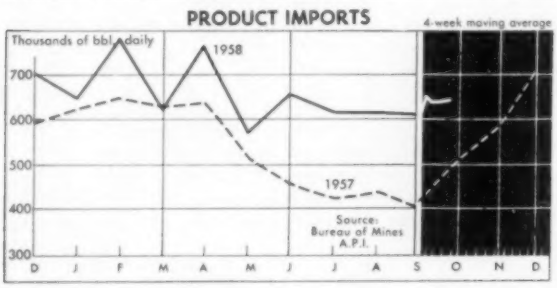

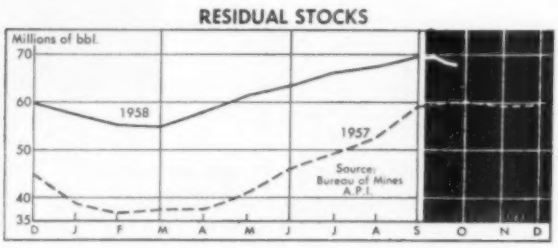

API REFINERY REPORT—OCTOBER 24, 1958

(Thousands of barrels)

District—	Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, October 1957 Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.
East Coast	1,079	474.7	25.1	292.1	167.7	39,971	11,649	59,361	12,752	1,088	487.2	24.5	306.7	166.6
Appalachian:														
District 1	96	41.9	4.9	19.7	9.6									
District 2	106	53.6	7.9	19.3	11.4	4,527	690	3,716	311	108	46.8	4.6	23.9	8.7
Ind., Ill., Ky.	1,407	715.7	78.4	283.9	193.1	2,268	594	1,525	137	109	54.8	5.6	17.9	11.5
Minn., Wis., Dak.	60	27.6	5.6	11.1	6.3	29,534	7,934	29,964	5,819	1,367	730.5	69.0	275.0	161.3
Okla., Kans., Mo.	625	361.7	12.0	156.3	18.9	6,598	1,478	8,640	517	82	38.9	1.6	22.6	7.2
Inland Texas	298	195.4	9.9	56.4	21.4	15,864	1,860	13,616	1,170	709	396.9	11.8	167.8	30.7
Texas Gulf Coast	1,845	968.7	104.9	477.6	205.6	6,575	383	2,028	2,098	256	206.3	7.6	48.5	26.4
La. Gulf Coast	697	384.4	83.4	158.7	64.1	21,810	3,624	17,823	8,231	1,792	924.3	97.7	432.3	208.6
N. La. and Ark.	98	49.7	6.0	20.3	5.7	9,936	1,771	7,557	1,548	614	355.5	31.9	164.4	42.2
Rocky Mountain:						4,076	1,111	2,119	109	85	35.5	5.7	18.8	5.6
New Mexico	18	15.3	0.1	3.0	1.0	423	35	156	54	28	15.4	0.5	5.5	3.5
Other Rky. Mt.	282	123.6	4.1	61.4	34.0	4,250	340	2,946	887	261	128.2	3.5	61.8	34.2
West Coast	1,142	522.8	18.1	164.6	293.6	22,518	414	14,465	34,221	1,151	474.8	1.5	160.1	345.2
Oct. 24, 1958	7,753	3,935.1	360.4	1,724.4	1,032.4	168,350	31,883	163,916	67,854	7,650	3,895.1	265.5	1,705.3	1,051.7
Oct. 17, 1958	7,613	3,713.0	350.3	1,814.9	976.9	170,361	31,520	161,341	68,020	.....	.....	.....	.....	.....
Oct. 25, 1957	7,649	3,907.1	286.7	1,732.3	997.3	179,288	35,486	175,469	59,465	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil and Refinery Prices at Representative U. S. and Foreign Points

REFINED-PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):	
Regular (89 octane)	11.50-11.625
Premium (99 octane)	14.50-14.625
Gulf Coast (cargoes for coastwise or export movements):	
Regular (90 octane)	10.25
Regular (92 octane)	10.50
Premium (97 octane)	11.625
Premium (98 octane)	11.75
California (rack) (Los Angeles):	
Regular (88 octane)	12.2-13.7
Premium (94 octane)	13.2-15.5
Premium (98 octane)	14.2-16.5
Caribbean area (cargoes):	
Regular (87 octane)	9.875
Premium (97 octane)	11.625

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

NATURAL GASOLINE*

Group 3:	
Grade 26-70	4.5
Breckenridge:	
Grade 26-70	4.0

*If 26-70 natural is considered as 100%, prices for lower-vapor-pressure grades increase 2.5% for each unit drop in Reid vapor pressure down to and including 16 lb. Prices for grades below 16 lb. may vary slightly by areas or plants.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):	
Kerosine 42-44	10.00
Diesel oil (58 d.i. and above)	9.75
Distillate No. 1	9.75
Distillate No. 2	9.00
Gulf Coast (cargoes):	
Kerosine 41-43	9.125
Distillate No. 2	8.625
New York Harbor (barges):	
★ Kerosine 41-43	10.20
★ Distillate No. 2	9.70
Diesel fuel, 48-52 d.i.	10.05
Caribbean area (cargoes):	
Distillate No. 2	8.625

WAX (LB.)

Oklahoma (Group 3):	
132-135 A.m.p. (semi-refined) in tank car	6.50
New York (export):	
126-130 A.m.p. crude-scale (solid in bags or barrels)	7.35

★Denotes change from previous week.

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):	
Residual fuel (max. 1% S)	$1.40-1.50
Gulf Coast (cargoes):	
Bunker C fuel	$2.00
New York Harbor (barges):	
Bunker C fuel	$2.37
Caribbean (cargoes):	
Bunker C	$2.00
California (rack):	
Bunker C fuel, Los Angeles	$2.10

LUBRICATING OILS

Mid-Continent (Group 3):	
150-160 bright stock, solvent refined, 0-10 pp., 95 v.i.	23.0
200 vis. neutral oil, solvent refined, 0-10 pp., 95 v.i.	20.5
Pennsylvania Grade:	
145-155 vis. at 210, bright stock, 8 color, 25 p.t.	22
200 vis. neutral (180° at 100°), 25 p.t.	21

CRUDE-OIL PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.	Mid-Cont.*	Gulf Coast Tex.†	West Tex.‡ N.M.	Wyo. (sour)
14-14.9	$1.86	....	....	....	....
15-15.9	1.95	....	....	....	$1.81
16-16.9	2.04	....	....	....	1.86
17-17.9	2.13	....	....	....	1.91
18-18.9	2.23	....	....	....	1.96
19-19.9	2.32	....	....	....	2.01
20-20.9	2.41	$2.75	....	$2.62	2.06
21-21.9	2.50	2.77	....	2.64	2.11
22-22.9	2.60	2.79	....	2.66	2.16
23-23.9	2.69	2.81	$3.44	2.68	2.21
24-24.9	2.78	2.83	3.46	2.70	2.26
25-25.9	2.87	2.85	3.48	2.72	2.31
26-26.9	2.96	2.87	3.50	2.74	2.36
27-27.9	3.06	2.89	3.52	2.76	2.49
28-28.9	3.11	2.91	3.54	2.78	2.54
29-29.9	3.16	2.93	3.56	2.80	2.59
30-30.9	3.22	2.95	....	2.82	2.63
31-31.9	3.27	2.97	....	2.84	2.67
32-32.9	3.33	2.99	....	2.86	2.71
33-33.9	3.38	3.01	....	2.88	2.75
34-34.9	3.44	3.03	....	2.90	2.79
35-35.9	3.49	3.05	....	2.92	2.83
36-36.9	3.55	3.07	....	2.94	2.87
37-37.9	3.60	3.09	....	2.96	2.89
38-38.9	....	3.11	....	2.98	2.91
39-39.9	....	3.13	....	3.00	2.93
40-44.9	....	3.15	....	3.02	2.95

*Includes Oklahoma (sweet), part of Kansas, North Dakota, West Texas (sweet). Some Oklahoma selling 14-31 cents under this schedule. †Low cold test crude. ‡Sour.

Effective dates of broad changes: California, 9-30-58; East of California, January 3-10, 1957; Pennsylvania Grade, 6-18-58.

FLAT PRICES

Louisiana:	
Sweet Lake	$3.00
Ville Platte	3.30
Texas:	
East Texas	3.25
Conroe	3.53
Van	3.08
Pennsylvania Grade:	
Bradford	3.90
Middle District	3.72
Southwest Pennsylvania	3.43
West Virginia	3.25
Buckeye Grade	3.25
Illinois Basin	3.00
Canada:	
Leduc-Woodbend	2.67
Redwater (Alta.)	2.56
Smiley (Sask.)	2.33
Pembina	2.52

FOREIGN

Venezuela:	
Cumarebo, 48°-49.9°, Tucupido	3.75
San Joaquin, 41°-41.9°, Puerto La Cruz	3.34
Oficina, 35°-35.9°, Puerto La Cruz	3.05
Tia Juana medium, 26°-26.9°, Amuay*	2.55
Quiriquire, 16.0°-16.4°, Caripito	2.15
Lagunillas heavy, flat, Las Piedras*	2.10
Las Piedras*	2.10
Bachequero, flat, 15°-16°, Las Piedras*	1.93

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Middle East, Persian Gulf (cargoes, f.o.b. lifting port):	
Arabian, 36.0°-36.9°, Ras Tanura	$2.12
Iranian, 34.0°-34.9°, Bandar Masur	2.04
Iranian, 34.0°-34.9°, Ababan	1.99
Iraq, 35.0°-35.9°, Fao	1.98
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.85
Qatar, 41.0°-41.9°, Umm Said	2.23
Middle East, E. Mediterranean:	
Arabian, 36.0°-36.9°, Sidon	2.49
Iraq, 36.0°-36.9°, Tripoli, Banias	2.49
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 37°	2.75

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(Latest reported spot fixtures)

★ Carib.-Montreal, clean (USMC—30%)	$2.84
★ Carib.-U.S.N.H., dirty (USMC—55%)	1.22
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P.G.-Calif., dirty (USMC—70%)	4.89

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C-250, C-150 IDEAL PUMPS, LROU, NKU Waukesha Engines. Complete Ideal No. 50 Rig. Lloyd Darlington, National Supply, Torrance, Calif.

MAGNETOMETER Askania Vertical temperature compensated ten gammas perfect condition $900.00. Box K-685, The Oil and Gas Journal, Tulsa, Oklahoma.

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1—Horiz. welded steel tank 8' dia. x 40', 9/16" shell, 1¼", dished heads.
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LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Denver, Colorado. Notice is hereby given that 1563.85 acres of land in three parcels within the known geologic structure of South McCallum Field, Jackson County, Colorado, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre, at 2 p.m., M.S.T., December 19, 1958, when bids will be opened. Details of the lease offering, how and where to submit bids, and forms, may be obtained from the Bureau's Land Office, P. O. Box 1018, Denver, Colorado. John L. Rankin, Manager.

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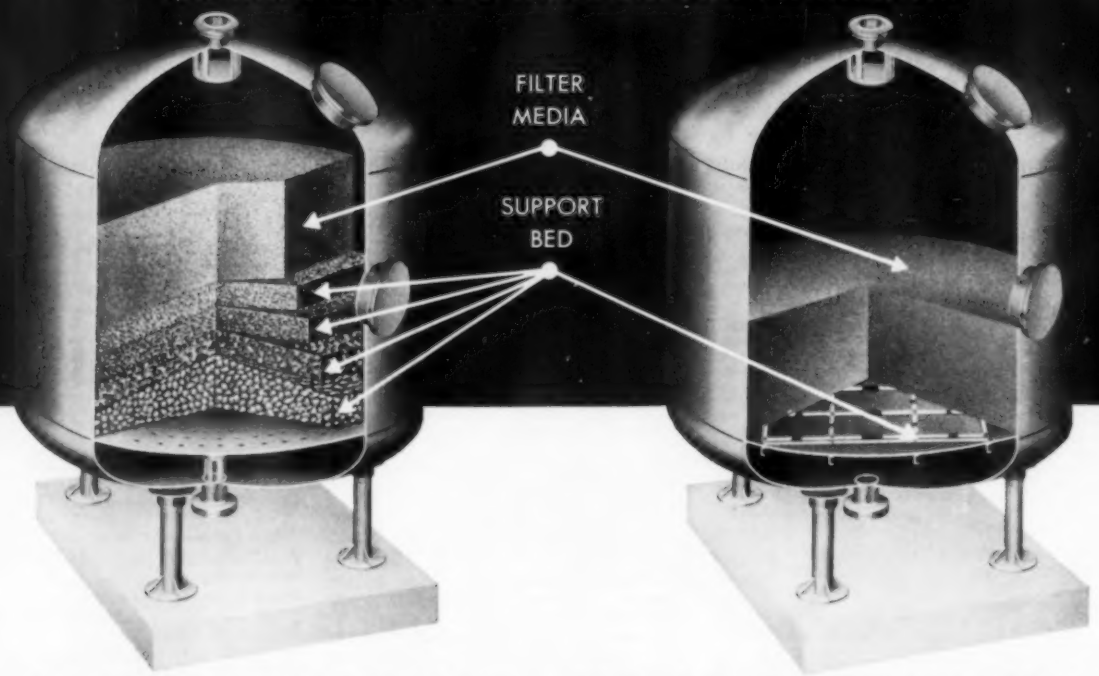

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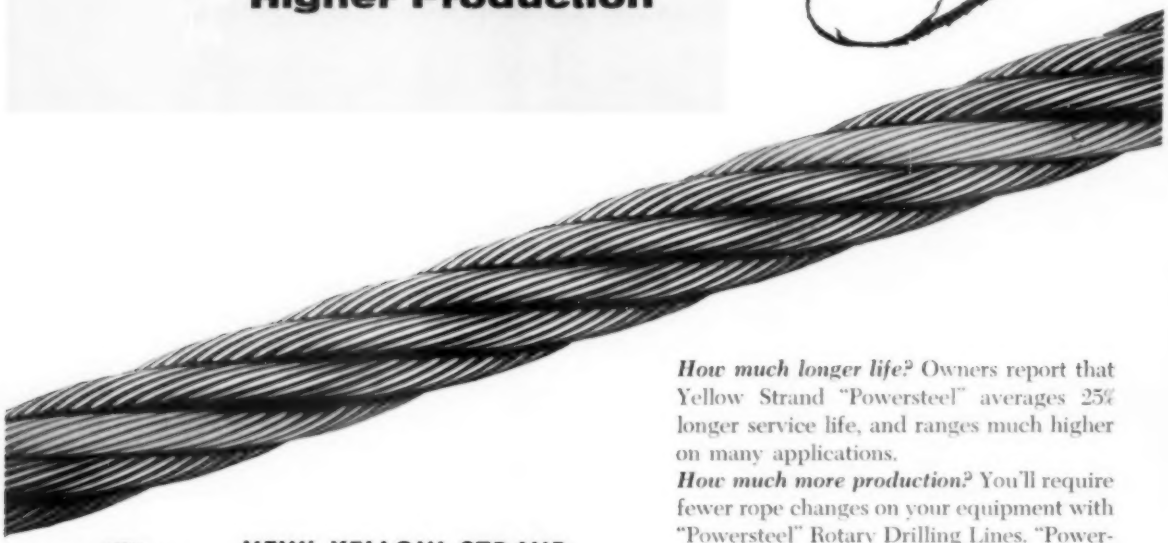

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